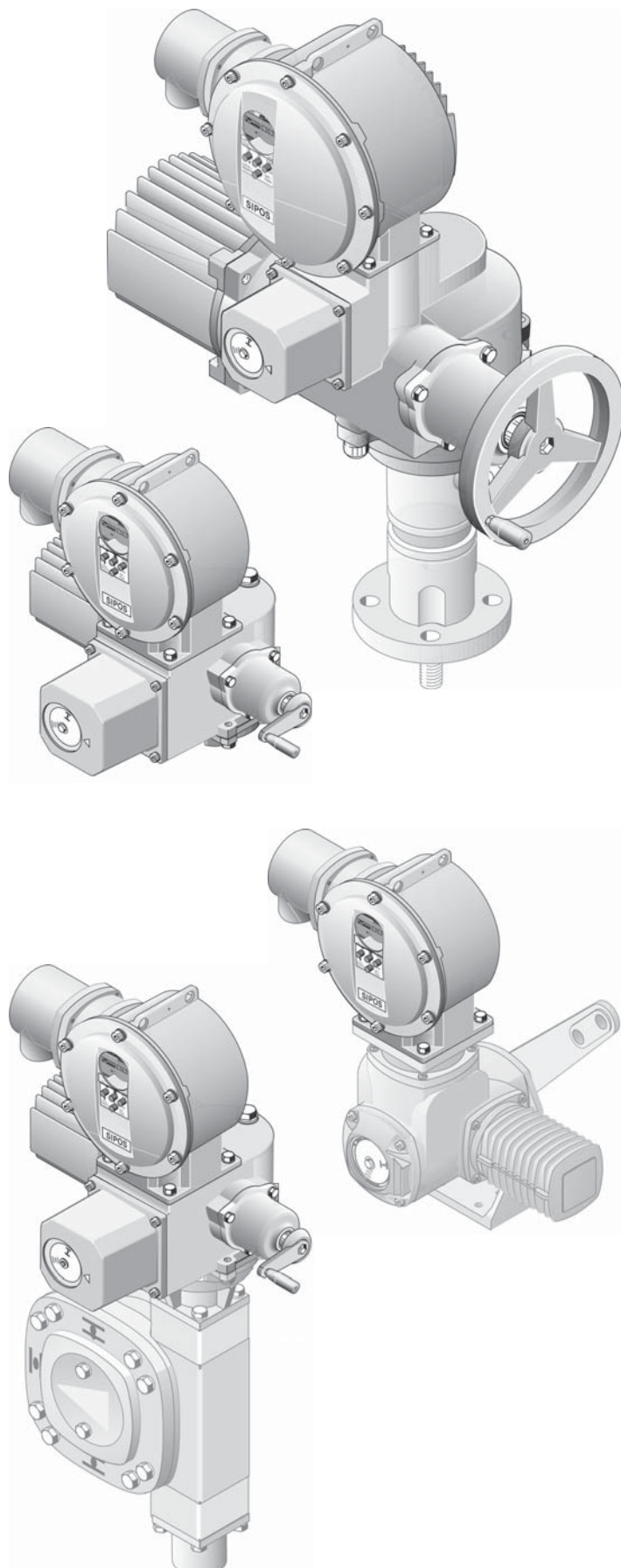


Operation
instructions

Electric actuators

**SIPOS 5
ECOTRON**



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1 General information

1.1 Safety information

General

The devices referred to in this document applies are components of installations conceived for industrial applications. They are designed in accordance with the recognized engineering rules.

All work involved in transport, assembly, installation, commissioning, maintenance and repair has to be performed by qualified personnel.

Qualified personnel within the meaning of the safety instructions of this documentation are all persons authorized to perform the required tasks according to the standards of safety technology and which may recognize and avoid potential hazards. They must be thoroughly familiar with the warnings at the device and the safety instructions of these operation instructions.

For work on power installations, the prohibition of the use of non-qualified persons or similar is stipulated in EN 50110-1 (formerly DIN VDE 0105) or IEC 60364-4-47 (VDE 0100 part 470).



■ Leakage

The leakage current of the actuators is typically greater than 3.5 mA. Therefore a fixed installation according to IEC 61800-5-1 is required.

■ Residual current circuit breakers or monitoring devices

Due to the integrated frequency inverter, a direct current can be induced in the protective earthing conductor. If the network an upstream residual current device (RCD) or residual current monitor (RCM) is used, then it must be of type B.

Correct transport, proper storage, mounting and installation, as well as careful commissioning are essential to ensure a trouble-free and safe operation.

The availability of this product is restricted according to IEC 61800-3 and may cause radio interferences in domestic environments. In this case it may be necessary to take additional measures.

The following is of particular importance:

- the technical data and information concerning the proper use (installation, connection, ambient and operating conditions) provided in the catalog, order documents, operation instructions, rating plate data and in the other product documentation;
- the general installation and safety guidelines;
- the local plant-specific regulations and requirements;
- the proper use of tools, lifting and transport equipment;
- the use of personal protective equipment, especially in high ambient temperatures and with high actuator surface temperatures (caused by frequent operation and long activation times).

Warnings on the device



Danger of crushing. When pressing in the hand crank or the hand wheel ensure that neither the hand nor the fingers are crushed, refer to figure.



Applicable for devices of the 2SA5.5/6/7/8 and 2SB555/6 series. Indicates the lubricant used. Refer also to chapter 7.2 „Lubrication intervals and lubricants“.

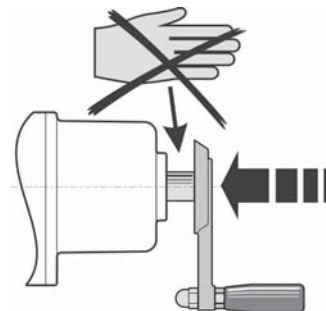


Fig.: Danger of crushing

1.2 Transport and storage

- The dispatch must be performed in sturdy packaging.
- For transport, loop the rope around the hand wheel housing, refer to illustration. Only use the eyes on the electronic unit (fig. item 1) to lift the actuator's own weight.
- Do not attach the ropes and hooks at the hand crank or hand wheel for the purpose of lifting.
- Store in well-ventilated, dry room.
- Protect against damp floors by storing on a shelf or pallet.
- Keep connection hood/cover and cable glands as well as the cover of the electronic unit closed.

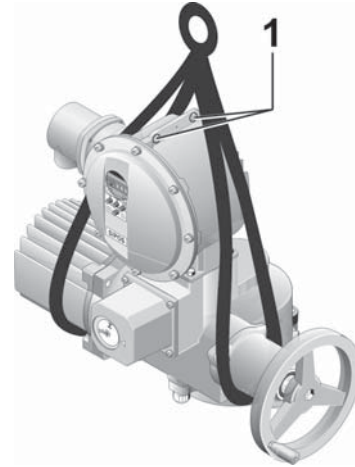


Fig.: Transport

1.3 Disposal and recycling

Packaging

The packaging of our products consists of environmentally friendly materials which can easily be separated and recycled. We use following packaging materials: Wood-based panels (MSB/OSB), cardboard, paper, PE foil. For the disposal of the packaging material, we recommend recycling and collection centers.

Actuator

Our actuators have a modular design and may therefore be easily disassembled, separated and sorted according to materials, i.e.: electronic parts, different metals, plastics, greases and oils.

The following generally applies:

- Collect greases and oils during disassembly. As a rule, these are substances hazardous to water and must not be released into the environment.
- Arrange for controlled waste disposal of the disassembled material or for separate recycling according to materials.
- Observe the national/local regulations for waste disposal.

1.4 Notes to the operation instructions

1.4.1 Safety instructions: Used symbols and their meanings

The following symbols, which have different meanings, are used in the operation instructions.

Non-observance may lead to serious injuries or property damage.



Warning marks activities which, if not carried out correctly, can affect the safety of persons or material.



Notice marks activities which have major influence on the correct operation. Non-observance of these notes may lead to consequential damage.



Electrostatically endangered parts are located on circuit boards, which may be damaged or destroyed by electrostatic discharges. If the boards need to be touched during setting, measurement or for exchange, it must be assured that immediately before touching an electrostatic discharge through contact with an earthed metallic surface (e.g. the housing) has taken place.



Procedures may have been performed by the valve manufacturer:
If actuators are delivered mounted to a valve, this step has been done in the valve manufacturer's factory. The setting has to be checked during commissioning.

1.4.2 Scope

For the sake of clarity, not all details of all versions of the product are described in these operation instructions, nor can they cover all conceivable cases regarding installation, operation and maintenance. For this reason, the operation instructions only contain instructions for qualified personnel (refer to section 1.1) that are necessary when the equipment is used for the purpose for which it is intended or in industrial applications.

If the devices are used in non-industrial applications with increased safety requirements, they have to be ensured by additional safety measures during assembly.

In case of any questions, and especially where detailed product information is not available, contact the SIPOS Aktorik sales representative in charge. Always state the type designation and the works number of the respective actuator (see rating plate).



It is recommended that the services and support of the responsible SIPOS Aktorik service centers are utilized for all planning, installation, commissioning and service task.

The contents of these operation instructions and product documentation shall not become part of or modify any prior or existing agreement, commitment or legal relationship. The Purchase Agreement contains the complete and exclusive regulation on material defect liability of SIPOS Aktorik. These contractual regulations are neither amended nor limited by the descriptions contained in these operation instructions and documentation.

1.5 Supplementary operation instructions

| | |
|-------------------------------------------------------------------------------------------|----------|
| 2SB5 linear actuator | Y070.027 |
| 2SC5 part-turn actuator | Y070.028 |
| 2SG5 small part-turn actuator | Y070.029 |
| COM-SIPOS computer parameterization software | Y070.024 |
| PROFIBUS operation instructions | Y070.023 |
| MODBUS operation instructions | Y070.022 |
| HART operation instructions | Y070.221 |
| Enclosure protection IP68 „K51“ | Y070.047 |
| Increased vibration resistance „K57“, „K58“ | Y070.048 |
| Increased vibration resistance according to seismic class S2A „K59“ | Y070.049 |
| Very high corrosion protection corrosivity category C5 with long protection time „L38“ | Y070.162 |
| SIPOS 5 actuator with USP | Y070.053 |
| Binary and analog inputs freely available via bus | Y070.050 |
| Short instructions ECOTRON and others | Y070.149 |

Any special installation and operation instructions furnished by the suppliers of subcontracted components, attachments or fixtures are attached to the set of instructions and have to be observed.

2 General

2.1 Functional principle

Description

The electronics with integral frequency converter (1) controls the motor (2). The motor turns the output drive shaft (4) via the worm shaft (3). The output drive shaft (4) drives a gear or a valve stem (5) via a stem nut.

The motion of the worm shaft (3) is transferred via the signaling shaft (6) to the signaling gear (7). The signaling gear reduces the movement and turns the potentiometer or the magnetic travel sensor (8).

From the position of the potentiometer or the magnetic travel sensor, the electronics recognizes the position of the output shaft (9) and therefore the position of the operated valve. The motor is controlled according to the process requirements.

The torque detection (DE) is performed electronically.

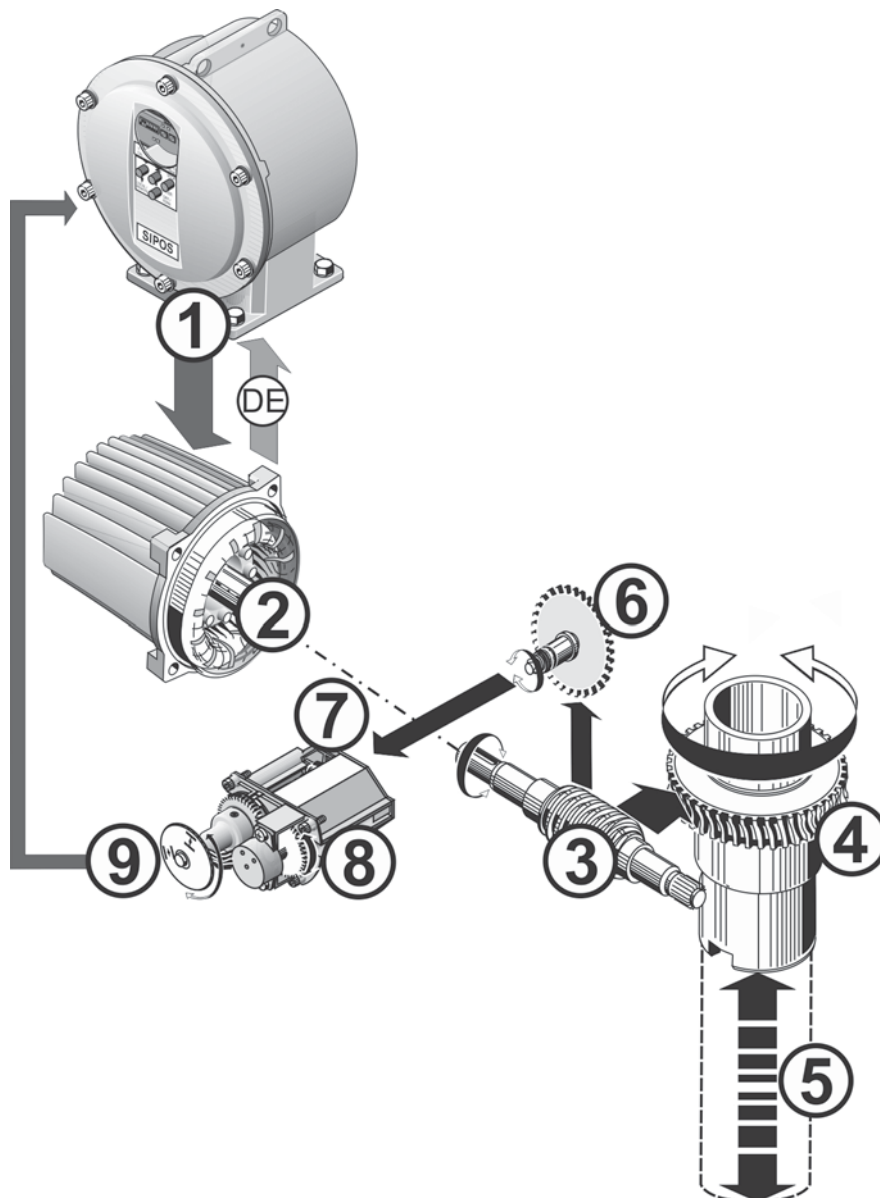


Fig.: Functional principle

2.2 Sub-assemblies

The actuators of the SIPOS 5 series comprise two main assemblies: gear unit and electronics unit.

For details see chapter 9 „Spare parts“.

The main sub-assembly gear consists of the following sub-assemblies:

- 1 Plug element electronic connection,
- 2 Motor,
- 3 Gear unit,
- 4 Signaling gear (not for 2SG5) with cover,
- 5 Manual drive (with crank or hand wheel),
- 6 Possible mechanical extensions, depending on the version.

For the small 2SG5 part-turn actuator, the signaling gear is omitted; gear unit and manual drive have a different shape.

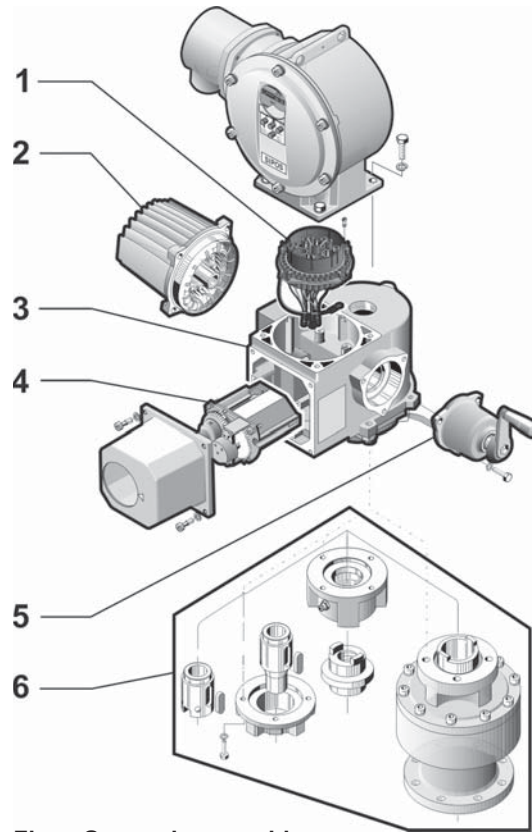


Fig.: Gear sub-assembly

The main sub-assembly electronics unit consists of the following sub-assemblies:

- | | |
|-----------------------------------------------------|------------------------------|
| 1 Electrical connection (there are three versions), | 5 Fieldbus board (option) or |
| 2 Plug element gear connection, | 6 Relay board (option), |
| 3 Electronic housing with cover, | 7 Control board. |
| 4 Power control PCB with Power module, | |

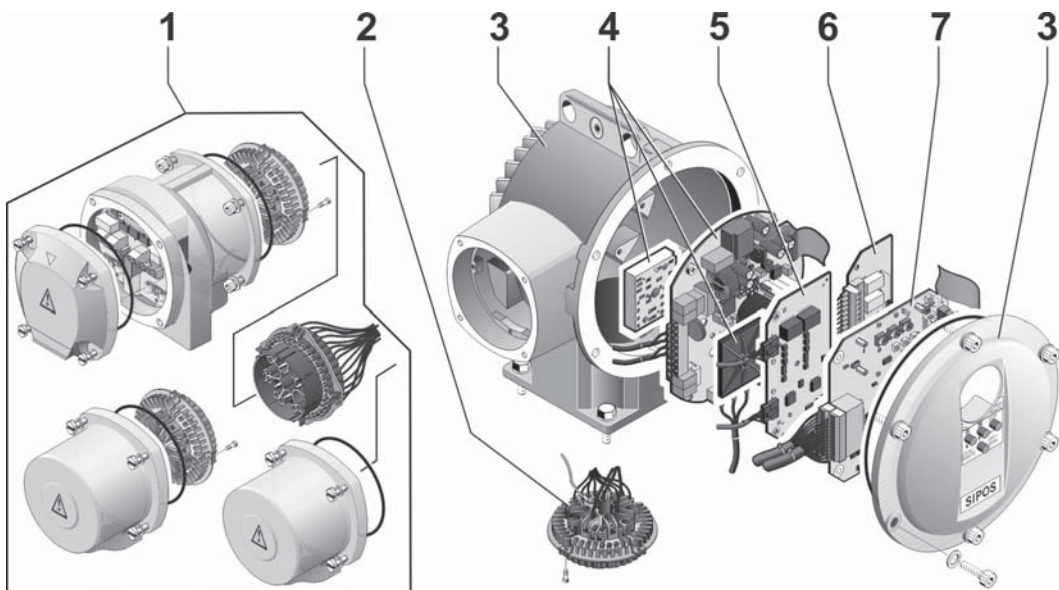


Fig.: Electronics unit sub-assembly

2.3 Block diagram (electrical connections)

The block diagram shows the electronic sub-assemblies and the inputs and outputs for possible customer-specific connections.

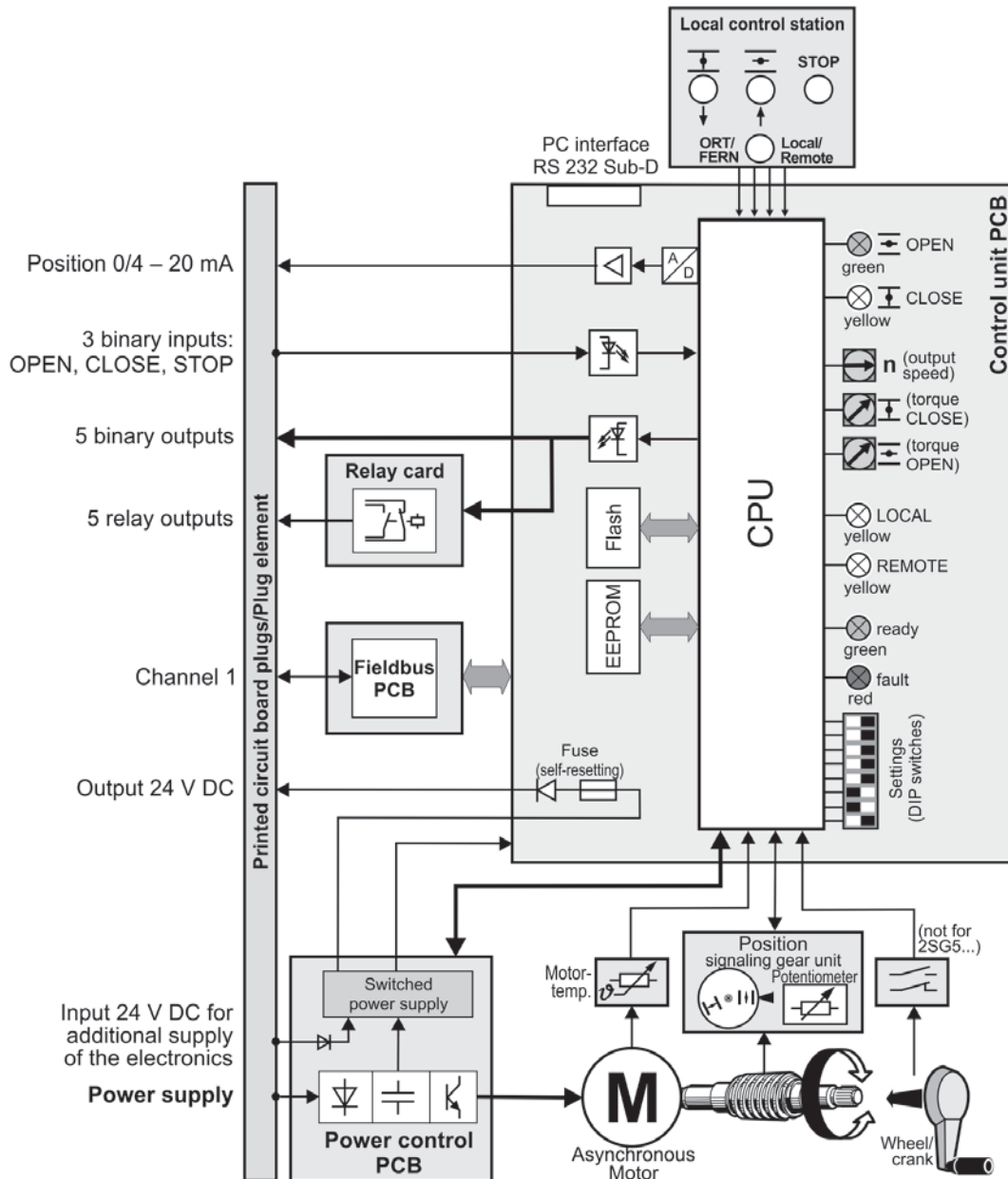


Fig.: Block diagram SIPOS 5 ECOTRON

3 Assembly and connection

3.1 Mounting to valve/gear



If actuators are delivered mounted to a valve, this step has been done in the valve manufacturer's factory. However, the setting has to be checked during commissioning.



- Please pay attention to the safety information (see chapter 1.1)!
- Before starting the assembly, please make sure that the intended measures (possible operation of the valve, etc.) is not likely to cause any injuries to persons or to interfere with the equipment.



It is recommended that the services and support of the responsible SIPOS Aktorik service centers are utilized for all planning, installation, commissioning and service task.

3.1.1 General assembly instructions for all output shaft versions

- Mounting and operation is possible in any position.
- Avoid all shocks; do not attempt to use force.
- Check that the end connection flange and the output shaft type match the valve/gear.
- Thoroughly degrease mounting faces at actuator and valve/gear.
- Slightly grease the connection points.
- Place the actuator on the valve/gear, making sure it is properly centered.
- Use bolts with at least 8.8 quality. If other similar, stainless steel bolts are used, they should be greased slightly with petroleum jelly. The depth of engagement should be at least 1.25 x the thread diameter.
- Position the actuator on the valve/gear and tighten the bolts evenly in diagonally opposite sequence.
- The housing of the SIPOS 5 actuators consists of an aluminum alloy which is corrosion resistant under normal environmental conditions. If the paint was damaged during assembly, it can be touched up with original paint supplied in small quantity units by SIPOS Aktorik.

3.1.2 Output shaft type A

Assembly instruction

The stem nut is screwed onto the valve stem by turning the hand crank or the hand wheel.

Fitting and removing the threaded bush

If the stem nut was not ordered with a trapezoidal thread (suffix „Y18“ to ordering number), or if the stem nut is worn and has to be replaced, proceed as follows:

Output flange (fig. item 1) does not have to be removed from the rotary actuator!

1. Unscrew centering ring (fig. item 5) from output flange.
2. Take off stem nut (4) together with axial needle-roller assembly and axial bearing washers (3).
3. Remove the axial needle-roller assembly and the axial bearing washers (3) from the stem nut.
4. Only if the stem nut was delivered without thread: Machine a thread in the stem nut (4) (check the concentricity and the axial run-out when it is clamped) and clean it.

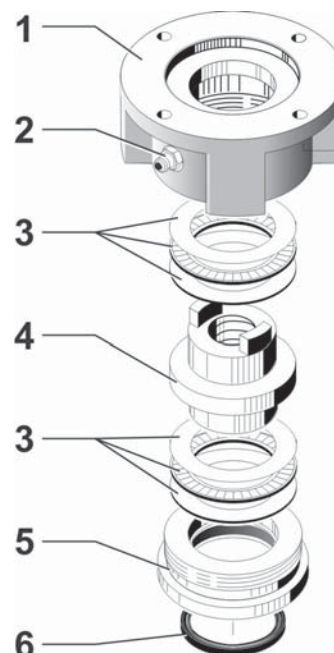


Fig.: Output shaft type A assembly

5. Lubricate axial needle-roller bearings and axial bearing washers (3) with ball bearing grease and fit them on the new or machined stem nut (4).
6. Insert stem nut (4) with axial needle-roller assembly into output flange (claws have to engage properly into the groove of the output shaft of the actuator).
7. Screw in the centering ring (5) and tighten it as far as the stop. Make sure the radial seal is inserted correctly (6).
8. Using a grease gun, press ball bearing grease into the grease nipple (2) until lubricant is discharged between the centering ring (5) and the stem nut (4).

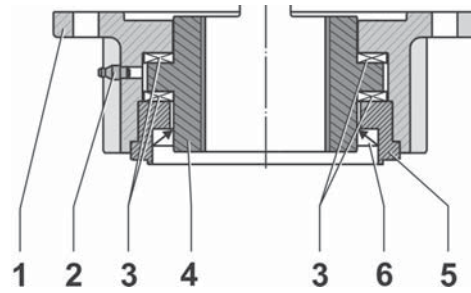


Fig.: Installed output shaft type A



For output shaft form A, ensure that the valve stem is greased separately!

3.1.3 Mount spindle protection tube

1. Remove fastener (fig. item 1).
2. Check that the extended stem does not exceed the length of the protective tube.
3. Apply sealing compound to the thread and the sealing faces (e.g. 732 RTV from Dow Corning, Munich, Germany).
4. Screw in the spindle protection tube (2).

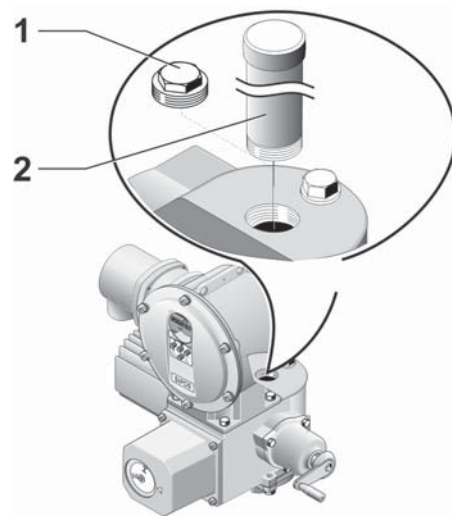


Fig.: Mounting the spindle protection tube

3.2 Electrical connection

The components are designed as to ensure that once connected correctly, uninsulated, live parts cannot be touched directly; i.e. protection against electric shock is provided in accordance with IP2X or IPXXB.



Dangerous voltages are also present when the motor is at a standstill. Before opening the terminal cover or the connection hood, disconnect the supply voltage from the actuator. Allow 5 minutes for the capacitors to discharge and do not touch any contacts.



- The supply voltage must always lie within the voltage range specified on the rating plate.
- **Mains cable:** Use metal cable glands for mains connection.
- **Signal cable:** Use metal cable glands with cable shielding for the connection of the control cable to avoid the occurrence of electronic faults. The signal cable must be shielded and the shield must be fixed or earthed on both sides. Ensure careful connection of the screen within the cable gland!
- It must be ensured that the **cable glands and seals** (O-rings) are fitted carefully and correctly in order to guarantee the enclosure protection. For details of the permissible conductor cross-sections, see wiring diagram.
- Cable glands and cables are not included in the scope of delivery.

3.2.1 Direct connection

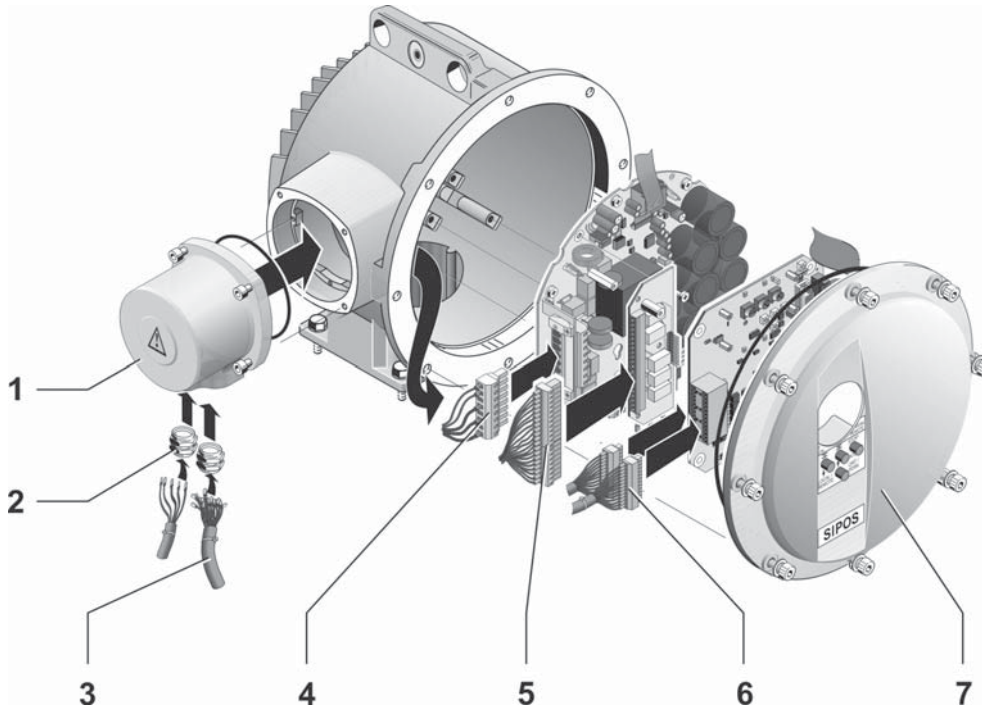


Fig.: Direct connection



Highly sensitive CMOS semiconductor components extremely, sensitive to static electricity are mounted on the printed circuit boards. Avoid touching tracks or components on the boards with the fingers and prevent tracks or components coming into contact with metal objects. Only the screws of the terminal blocks may be touched in order to make the connections and only with an insulated screw driver.

1. Unscrew connection hood (fig. item 1) and cover for electronic housing (7).
2. Unscrew screw plugs from the required cable glands in the connection hood.
3. Screw in the cable glands (2) only slightly and insert the connecting cables (3).
4. Take off terminal plug X1 (4) from the power control PCB and terminal plugs X3.1, X3.2 (6) from the control board. If a relay board is used, then remove terminal plugs X2.1, X2.2 (5). If required, use a screw driver to carefully eject the plugs from the sockets.
5. Connect the connecting cables in accordance with the circuit diagram enclosed in the connection hood, connecting the earth lead conductor to the provided terminal in the connection box.
6. Reconnect all terminal plugs.
7. Fit connection hood (fig. item 1) and cover for electronic housing (7) again.
8. Tighten cable glands (2).

3.2.2 Connection with round plug

1. Unscrew connection hood (fig. item 2) with plug element (1).
2. Unscrew screw plugs from the required cable glands in the connection hood.
3. Unscrew plug element (1) from connection housing (2).
4. Screw in the cable gland (3) only slightly and insert the connecting cables (4).
5. Connect the connecting cables in accordance with the circuit diagram enclosed in the connection hood, connecting the earth lead to the provided terminal in the connection box.
6. Screw plug element (1) into the connection hood (2) and then fix connection hood.
7. Tighten cable glands (3).

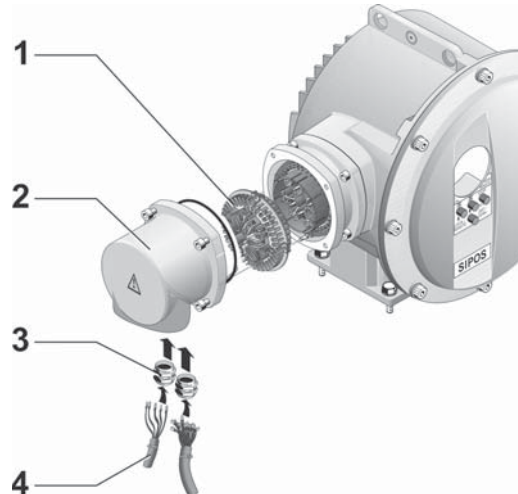


Fig.: Connection with round plug

3.2.3 Fieldbus connection

1. Dismantle fieldbus connection housing (fig. item 2) and connection cover (4).
2. Unscrew plug element (1) from fieldbus housing (2).
3. Unscrew screw plugs from the required cable glands in the fieldbus connection housing.
4. Screw in the cable glands (5) only slightly and insert the connecting cables (6). For fieldbus cables, cable glands without shield are sufficient, refer to point 7 below.
5. Connect the mains cables and, if required, signal cables in accordance with the circuit diagram enclosed in the connection hood, connecting the earth lead conductor to the provided terminal in the connection box.
6. Fit plug element (1) into fieldbus housing (2) again.
7. Connect fieldbus connecting cables to the bus termination PCB (3). Lead shielding (7) under metal clamp (8).
8. Fit connection cover (4) and fieldbus housing (2) again.
9. Tighten cable glands (5).

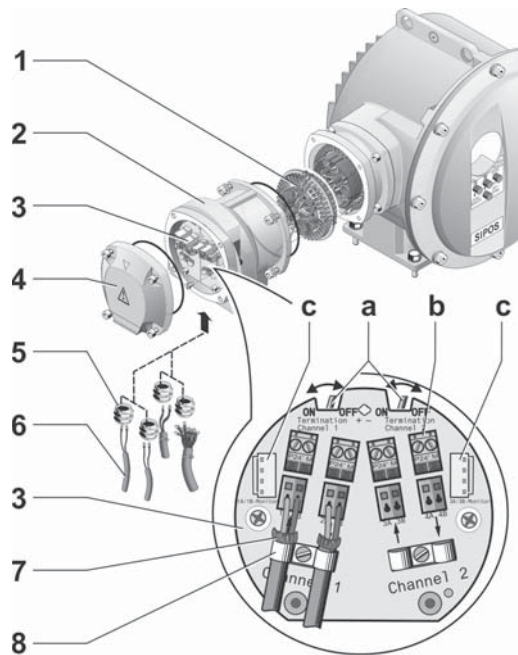


Fig.: Fieldbus connection

a = If the actuator is the last device of the bus segment, the termination resistor must be set to ON or a termination must be done externally.

b = Connection for external 24 V power supply. Enables communication even if the mains are disconnected.

c = Connection for PROFIBUS DP bus motor (protocol analyzer).

3.2.4 Connection with galvanic separation

Binary inputs and outputs are galvanically separated via opto-couplers. Analog signals can be galvanically separated as an option. This is required to avoid overlapping currents and voltages by means of equalization potentials.

When ordering „Actual position (analog output) galvanically separated“, **state** add. version **C10**.

1. Unscrew fieldbus connection housing (fig. item 2) and connection cover (4).
2. Unscrew plug element (1) from connection hood (2).
3. Unscrew screw plugs from the required cable glands in the connection housing.
4. Screw in the cable gland (5) only slightly and insert the connecting cables (6).
5. Connect the connecting cables in accordance with the circuit diagram enclosed in the connection hood, connecting the earth lead to the provided terminal in the connection box. Connect the wire for analog signals „actual position value“ to the connection board (3). Lead shielding under the metal clamp.
6. Screw plug element (1) into connection housing (2).
7. Fit connection housing (2) and connection cover (4) again.
8. Tighten cable glands (5).

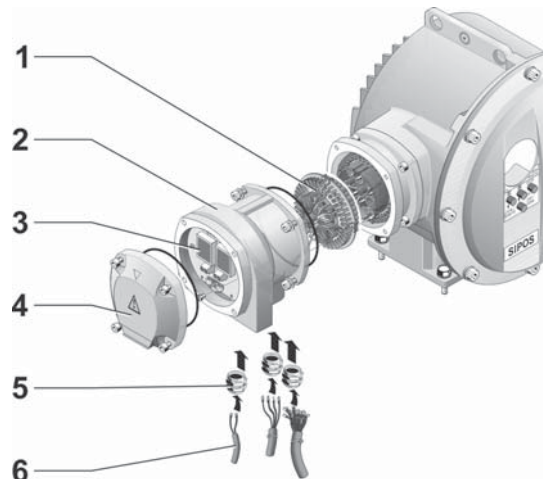


Fig.: Connection with galvanic separation

3.2.5 External potential conductor connection

The external potential conductor connection can be used for functional grounding, not for protective grounding.

1. Remove plastic fastener (1) from the electronic housing.
2. Fit potential conductor (3) with M5 screw (2) and gripping disc (4).

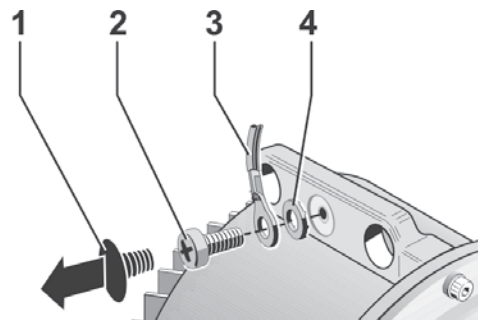


Fig.: Fitting the potential conductor

3.3 Separate mounting

If the ambient conditions such as extreme vibration, high temperature and/or if access is difficult, the electronics unit is to be mounted separately from the gear.

The assembly kit for mounting the gear unit and electronics unit separately can be ordered directly with the actuator or separately as accessory (2SX5300-...). The assembly kit is preassembled. If the assembly kit is ordered directly with the actuator, it is included separately with the actuator.



Before starting the work, disconnect actuator from the mains!

Procedure

1. Install mounting bracket (fig. item 3) at the mounting location of the electronics unit.
2. Remove electronic housing (1) from the gear unit (6) and mount it on the mounting bracket (3) with the O-ring (2).
3. **Standard assembly, refer to A**
Mount „Separate mounting“ kit: Plug cover with contact pins (4) on lower side of wall bracket (3) and plug cover with contact sockets (5) on the gear unit (6).
4. **Assembly with spindle protection tube, refer to B**
Turn connection hood by 90° or 180° to ensure cables are not impaired by the spindle protection tube. Remove screws (7) from round plug, turn round plug by 90° to 180° and fix screws again. Continue as described in section 3.

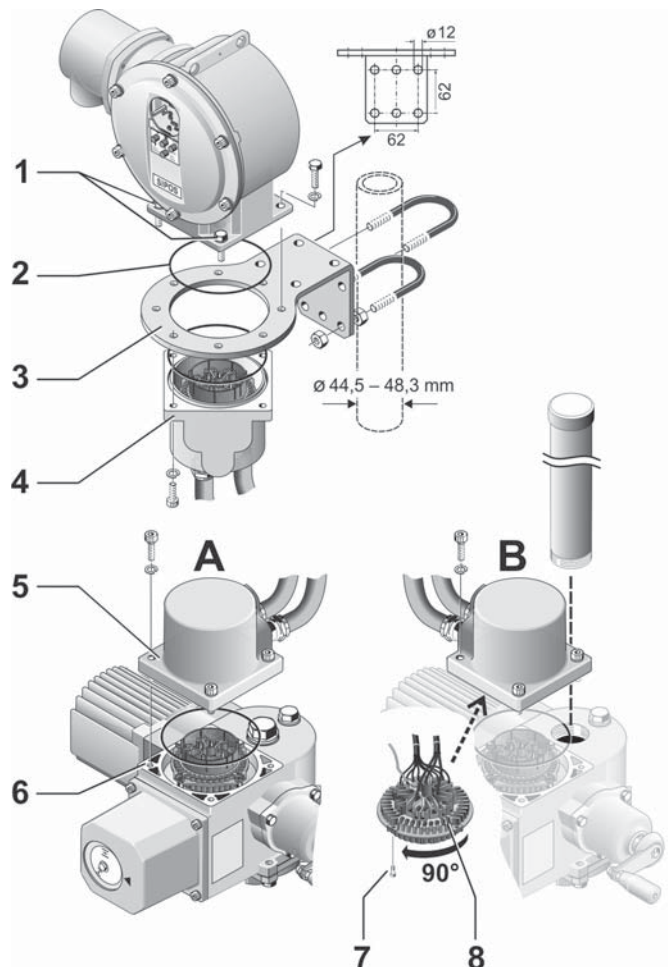


Fig.: Separate mounting
A = Standard, B = with spindle protection tube



- During installation, it is important to ensure that the O-rings are fitted correctly in order to guarantee the degree of protection.
- Generally, it has to be ensured that movable parts, e.g. those of the swing lever, are not impaired by the cables.
- In exceptional cases, the motor might become very hot. Therefore the cables should not touch the motor.

Specification of the connecting cable between the electronics unit and the gear unit

Power supply : Shielded and UV resistant, e.g. TOPFLEX®-611-C-PUR-4G1,5/11,3.
(TOPFLEX® is a trade mark of HELUKABEL.)

Control connection: shielded and UV resistant, e.g. LIY11Y-7x2x0,5/11,4-S.

The crimp contacts of the signal cables are gold plated.

The connecting cables are available in different versions:

- Standard lengths: 3 m; 5 m; 10 m,
- with additional device (filter) up to 50 m;
(if separate mounting of more than 10 m with filter, the „Sep. mounting“ parameter must be set to value „>10m with filter“).

4 Instructions on operator control and operation

4.1 Hand crank, hand wheel



- Motor driven operation of the hand crank/hand wheel is not permitted.
- After commissioning, the actuator must not be operated beyond the parameterized end positions using the hand crank/hand wheel.
- When pressing in the hand crank/ the hand wheel, make sure that the hand is not between the hand crank/the hand wheel and the housing: Danger of crushing! See the following operation step 3.

During motor operation the hand crank/the hand wheel does not turn.

Operation

Operation of all actuators except for 2SG5:

1. The actuator must be at standstill (1).
2. Remove the clamp (option) (2). The clamp is used as protection against accidental engaging of the hand crank/the hand wheel, if the actuator is exposed to heavy vibration or water pressure (enclosure protection IP 68).
3. Press hand crank/hand wheel in direction of the gear housing against the spring force (3) and turn (4). (Caution: Danger of crushing when engaging!)

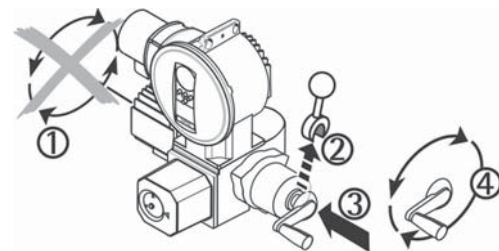


Fig.: Operating the crank handle

The hand wheel has priority over motorized operation. The actuator can only be operated electrically once the hand crank/hand wheel is released.

Only for 2SG5:

Turn hand wheel without pressing it in. Manual operation interferes with motor operation: If the hand wheel is turned during motor operation, the positioning time is either extended or reduced, depending on the direction of rotation.

Direction of rotation

Clockwise turning of the hand crank/hand wheel leads to

- 2SA5 rotary actuator: Clockwise rotation of the output drive shaft (exception: 2SA5.7. and 2SA5.8.).
- 2SB5 linear actuator: Extension of the thrust rod.
- 2SC5 part-turn actuator: With view on the pointer cover of the worm gearbox: clockwise movement of the coupling or lever arm with the worm gearbox versions RR or LR.
- 2SC5 part-turn actuator: With view on the mechanical position indicator: clockwise rotation at the coupling or at the swing lever.

4.2 Local control station

On local control station, the operation can be made directly at the actuator via 4 push buttons (refer to fig. Local control panel).

By pressing the **Remote/Local** push button, you can change between two states „Remote“ and „Local“.

Depending on the state the actuator is in, the push buttons have different functions.



The COM-SIPOS parameterization program enables convenient operation of the actuator, refer to chapter 4.4. The actuator can be controlled from the computer (laptop) via a cable.

4.2.1 Meaning of the LEDs and functions of the push buttons

“Local” and “Remote” LEDs

The LEDs indicate the state of the actuator:

- „Remote“: LED **Remote** (yellow) is illuminated;
- „Local“: LED **Local** (yellow) is illuminated;

LEDs (OPEN) and (CLOSE)

The OPEN LED (green) is flashing if the actuator moves in OPEN direction and is continuously illuminated, if the actuator is in end position OPEN. The same applies to the CLOSE LED (yellow).

LEDs H1 and H2

The LEDs H1 (green) and H2 (red) indicate status and fault signals, see following chapter 6 „Status and fault signals“. In addition, these LEDs indicate the status in the end positions.

Function of the push buttons in the „Local“ state

In the „Local“ state, the actuator can be operated on site (OPEN, CLOSE as well as STOP), control from „Remote“ is disabled.

1 STOP/ENTER push button

The STOP/ENTER push button stops the actuator.

2 Local/Remote push button

The Local/Remote push button allows selection between „Local“ and „Remote“.

3 Push button (OPEN)

When pressed, the actuator moves in the OPEN direction. For short operation (< 2 s), the actuator moves as long as the push button is pressed. If the push button is held down for more than 2 seconds, the actuator moves up to the end position once the push button is released or the push button STOP or CLOSE is pressed (self-locking).

4 Push button (CLOSE)

When pressed, the actuator moves in the CLOSE direction. Behavior similar to push button OPEN.

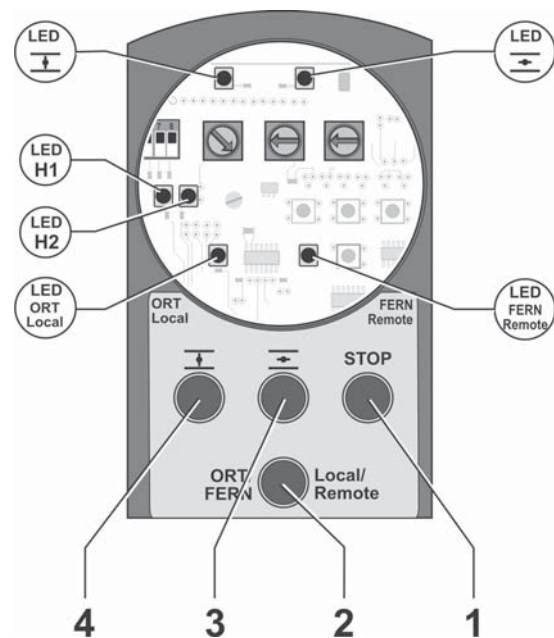




Fig.: Local control panel



Pressing push buttons OPEN  and CLOSE  at the same time activates the EMERGENCY function: The actuator moves at the set output speed/positioning speed/positioning time to the EMERGENCY position (end position CLOSED).





If the Local/Remote button is pressed in the „Local“ state, the actuator changes to the „Remote“ state and moves in case of an operation command from the DCS!


4.2.2 Indication of the actuator state

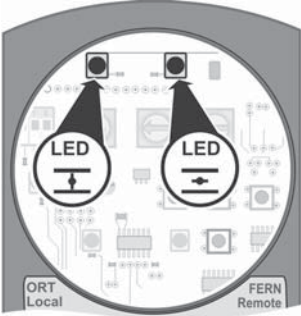












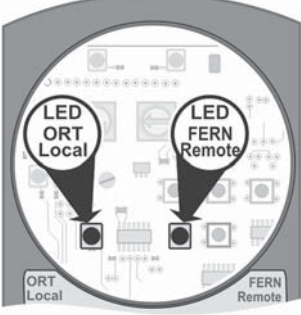




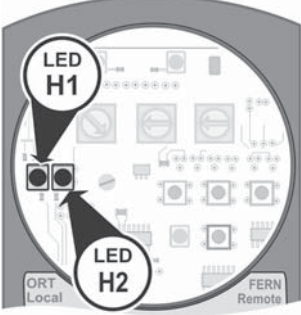










By means of their state - illuminated or flashing - the LEDs indicate the current actuator state.

The states of the LEDs (off – on – flashing) are represented in the operation instructions as follows:

 LED is not illuminated

 LED is illuminated

 LED is flashing

| Arrangement of the LEDs | State of the LEDs | | Explanation |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  (yellow) |  (green) | The CLOSE and OPEN LEDs indicate whether the actuator ■ is at standstill, ■ moves and in which direction (OPEN or CLOSE), ■ is in end position and in which (OPEN or CLOSED). |
| |  |  | Both LEDs are off: Actuator is at standstill and in mid-travel. |
| |  |  | The CLOSE LED is flashing: The actuator operates in direction CLOSE. |
| |  |  | The OPEN LED is flashing: The actuator operates in direction OPEN. |
| |  |  | The CLOSE LED is illuminated: The actuator is in end position CLOSED. |
| |  |  | The OPEN LED is illuminated: The actuator is in end position OPEN. |
|  | Local (yellow) | Remote (yellow) | The Local and Remote LED indicate the state the actuator is in: „Local“ or „Remote“. |
| |  |  | The actuator is in the „Local“ state. |
| |  |  | The actuator is in the „Remote“ state. |
|  | H1 (green) | H2 (red) | The H1 and H2 LEDs indicate: „ready for operation“ or „fault“ and the states during commissioning. |
| |  |  | The H1 LED is illuminated: The actuator is ready for operation. |
| |  |  | The H1 LED is flashing: The actuator is in the commissioning state. |
| |  |  | For the states during commissioning refer to the following chapters. |
| |  |  | The H1 LED is off: Fault! |
| |  |  | Refer to „Status and fault signals“ chapter. |

4.3 Remote control

4.3.1 Control

The control of the actuators depends on the automation system and can be performed via

- **conventional connection** (24 V binary) or
- **Fieldbus** (e.g. PROFIBUS DP or MODBUS RTU).
Each actuator (device) on the bus is accessed via its bus address. On delivery, the bus address is preset for all devices: 126 for PROFIBUS and 247 for MODBUS, unless ordered otherwise using the programming form, add. version „Y11“. The operation via a fieldbus interface is also described in the separate operation instructions, refer also to chapter 1.5 „Supplementary operation instructions“. The change-over from „Remote“ to „Local“ can be disabled via fieldbus.



An EMERGENCY command sent from the DCS is always executed by the actuator (irrespective of the selected control mode and signal source), even if the actuator is conventionally controlled and the EMERGENCY command is sent via fieldbus and vice versa.

4.3.2 Observing

Observing from remote is only possible with fieldbus control.

PROFIBUS DP

The device parameterization can be read via cyclic and acyclic services. A large variety of software tools is available for simple integration.

Manufacturer-independent project planning and parameterization tools:

- SIMATIC PDM (**P**rocess **D**evice **M**anager). The SIPOS 5 Flash device description EDD (**E**lectronic **D**evice **D**escription) is stored in this parameterization and project planning tool.
- FDT/DTM (**F**ield **D**evice **T**ool/**D**evice **T**ype **M**anager). The SIPOS 5 Flash device description DTM is available for the integration in the parameterization tool FDT.

■ **MODBUS RTU**

The device parameters can be read via so called „Holding Registers“ and „Coils“. Observing and diagnosis is possible via „Input Register“ and „Discrete Input“.

4.4 COM-SIPOS

The COM-SIPOS parameterization program is a software tool for

- operation: operation of the actuator in local operation;
- observing: reading the actuator parameters, the device state in the „Local“ and „Remote“ state;
- diagnosis: trouble shooting;
- loading new firmware: software update to the state-of-the-art;
- archiving: saving the actuator parameters.

COM-SIPOS allows enhanced programming at the actuator.

The connection between computer and actuator is established via a standard null modem cable.

COM-SIPOS is available including null modem cable, USB serial adapter and user manual (on CD), ordering number: **2SX5100-3PC02**.

5 Commissioning

5.1 General information



- Before performing any work on the installed actuator, check with the plant personnel in charge that the commissioning may not cause any fault of the plant or hazards to persons.
- If a cut-off mode is selected that is not appropriate for the valve, the valve may be damaged!
- There are hazardous voltage steps within the actuator.
- If the Local/Remote button is pressed in the „Local“ state, the actuator changes to the „Remote“ state and moves if there is an operation command from the DCS!



- Change to the „Local“ state before commissioning.
- It is recommended that the services and support of the responsible SIPOS Aktorik service centers are utilized for all planning, installation, commissioning and service task.

5.1.1 Ensuring prerequisites for commissioning

Check and ensure the following points after assembly or during revision and inspection:

- The actuator is correctly assembled.
- All fixing screws and connecting elements are firmly tightened.
- The grounding and equipotential bonding has been correctly implemented.
- The electrical connections have been correctly implemented.
- All protection against accidental contact has been implemented for moving or live parts.
- Neither the actuator nor the valve is damaged.
- The permitted temperature range for the actuator is maintained and heat dissipation from the final control element is also taken into account.

Further checks are also necessary in accordance with the plant-specific conditions.

5.1.2 The commissioning steps have to be performed in the following sequence and are described in detail below



- You do not have to perform all settings. Depending on whether settings have already been specified when ordering the actuator or whether the actuator was delivered mounted on the valve, checking the settings will be sufficient.
- After changing the settings, the DIP switch S8 has to be set to ON and then to OFF again to accept the changes.

1. Set/check output speed or positioning speed/positioning time and tripping torques/forces.
2. Set/check closing direction, cut-off mode and control mode.
3. Select one of the 4 output signal sets and determine the predefined signals at the 5 signaling outputs.
4. Check/adjust signaling gear ratio and end positions.
The signaling gear ratio only has to be set, if the setting was not specified when ordering the actuator and the default setting does not meet the requirements.
5. Check/set mechanical position indicator, if available.

5.1.3 Potentiometer and DIP switches

The settings are made at the potentiometers and the DIP switch on the electronics board. Unscrew the cover of the electronics unit.

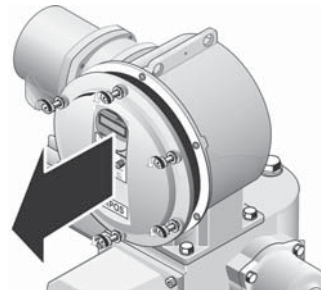


Fig.: Removing the cover

Arrangement of the potentiometer and the DIP switch on the electronics board

- 1 DIP switches:
Settings see below
- 2 Potentiometer:
Output speed/positioning speed/positioning time
- 3 Potentiometer:
Tripping torque/force in end position CLOSED
- 4 Potentiometer:
Tripping torque/force in end position OPEN

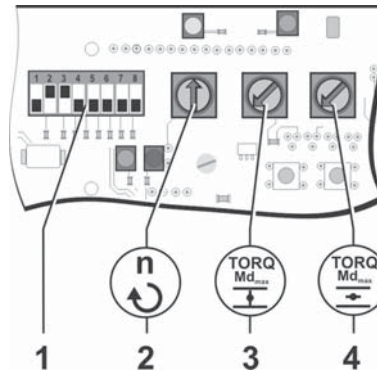


Fig.: Arrangement of the potentiometer and the DIP switches

DIP switches

- S1** Closing direction: clockwise or counter-clockwise
- S2** Cut-off mode CLOSE: Travel or torque dependent
- S3** Cut-off mode OPEN: Travel or torque dependent
- S4 and S5** output signal sets: Four sets can be selected
- S6** Control mode „REMOTE“: Permanent contact or pulse contact (self-retaining)
- S7** Acceptance of end position setting
- S8** Acceptance in general

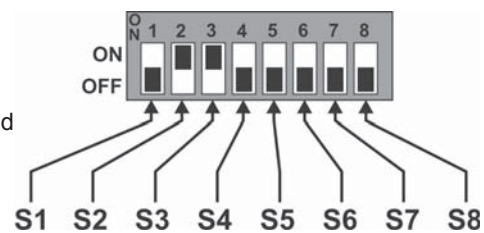


Fig.: DIP switches



Unless required otherwise by the customer, the potentiometer settings indicated here and the underlined settings of the DIP switches are the default settings.

5.2 Setting speeds, tripping torques

New actuators are set in the factory. Unless required otherwise by the customer, the default parameters are as follows:

- Output speed/positioning speed/positioning time for operation in CLOSE and OPEN direction: Level 4 of the 7-level setting range (step-up factor 1.4).
- Tripping torques/forces in OPEN and CLOSE direction: lowest, device-dependent setting value, for the standard actuator 30 %, for the modulating actuator 50 % of the maximum value (cannot be changed for the 2SG5).

If the current setting should be retained, continue with chapter 5.3 „Closing direction, setting the cut-off modes“.

5.2.1 Setting speeds/positioning speeds/positioning times

Setting the output speeds determines the actuator speed. Depending on the actuator type, different values can be set for the output speed:

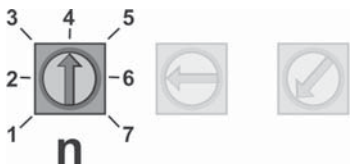
| Speeds for rotary actuator 2SA5 | | | | | | | |
|---------------------------------|----------------------------------------|------|-----|-----|----|-----|-----|
| Speed ranges | Possible values for output speed [rpm] | | | | | | |
| Standard actuator | | | | | | | |
| 1.25 – 10 | 1.25 | 1.75 | 2.5 | 3.5 | 5 | 7 | 10 |
| 2.5 – 20 | 2.5 | 3,5 | 5 | 7 | 10 | 14 | 20 |
| 5 – 28 | 5 | 7 | 10 | 14 | 20 | 28 | --- |
| 5 – 40 | 5 | 7 | 10 | 14 | 20 | 28 | 40 |
| 10 – 80 | 10 | 14 | 20 | 28 | 40 | 56 | 80 |
| 20 – 112 | 20 | 28 | 40 | 56 | 80 | 112 | --- |
| 20 – 160 | 20 | 28 | 40 | 56 | 80 | 112 | 160 |
| Modulating actuator | | | | | | | |
| 1.25 – 10 | 1.25 | 1.75 | 2.5 | 3.5 | 5 | 7 | 10 |
| 5 – 40 | 5 | 7 | 10 | 14 | 20 | 28 | 40 |
| Speed steps: Standard = 4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| Positioning speeds for linear actuator 2SB5 | | | | | | | |
|---------------------------------------------|------------------------------------------------|----|----|-----|-----|-----|-----|
| Positioning speed ranges | Possible values for positioning speed [mm/min] | | | | | | |
| 25 – 200 | 25 | 35 | 50 | 70 | 100 | 140 | 200 |
| 30 – 240 | 30 | 42 | 60 | 84 | 120 | 168 | 240 |
| 35 – 280 | 35 | 49 | 70 | 98 | 140 | 196 | 280 |
| 40 – 320 | 40 | 56 | 80 | 112 | 160 | 224 | 320 |
| Positioning speed steps: Standard = 4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| Positioning times for part-turn actuators 2SC5 and 2SG5 | | | | | | | |
|---------------------------------------------------------|----------------------------------------------|-----|----|----|----|----|----|
| Positioning time range | Possible values for positioning time [s/90°] | | | | | | |
| 2SC5 160 – 20 | 160 | 112 | 80 | 56 | 40 | 28 | 20 |
| 2SG5 80 – 10 | 80 | 56 | 40 | 28 | 20 | 14 | 10 |
| Positioning time steps: Standard = 4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Setting

The speed is set via the left potentiometer.

| Potentiometer | Function |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Setting the</p> <ul style="list-style-type: none"> ■ output speed for rotary actuators, ■ positioning speed for linear actuators, ■ positioning time for part-turn actuators. <p>Seven (7) setting steps are possible within a type-dependent range (the actuator type can also be determined from the name plate).</p> <p>Setting: Turn potentiometer to the desired level (1 – 7). For the setting values per level, refer to the table above.</p> |
| <p>In case no further settings are performed,</p> <ul style="list-style-type: none"> ■ set DIP switch S8 to ON and then to OFF again and ■ fit the cover of the electronics unit using screws. | |

5.2.2 Setting tripping torques/forces

Tripping torque/force

The setting of the tripping torque for the rotary and part-turn actuator, and of the tripping force for the linear actuator determines which torque or which force has to be reached until the motor trips. This applies to torque/force-dependent tripping in the end position as well as to a block. For this reason, tripping torque or force also have to be set for travel-dependent tripping.

The setting range for the standard actuator ranges from 30 – 100 % and for the modulating actuator from 50 – 100 % of the maximum torque in 10 % steps each (for some part-turn actuators, other limit values apply). Default setting is the lowest possible value (typically 30 % of the maximum value for the standard actuator, and 50 % for the modulating actuator).

The following tables show the possible setting values.

For the 2SG5 part-turn actuator, the tripping torque cannot be changed.

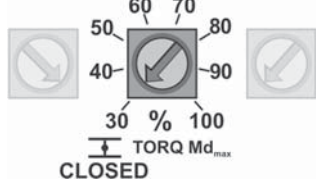
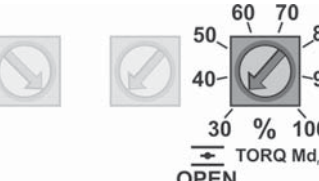
| Tripping torques for rotary actuator 2SA5 | | | | | | | | |
|-------------------------------------------|----------------------------------|------|------|------|------|------|------|------|
| Tripping range | Possible values for setting [Nm] | | | | | | | |
| Standard actuator 2SA50 | | | | | | | | |
| 9 – 30 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| 18 – 60 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| 37 – 125 | 37 | 50 | 62 | 75 | 87 | 100 | 112 | 125 |
| 75 – 250 | 75 | 100 | 125 | 150 | 175 | 200 | 225 | 250 |
| 150 – 500 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
| 300 – 1000 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| 600 – 2000 | 600 | 800 | 1000 | 1200 | 1400 | 1600 | 1800 | 2000 |
| 1200 – 4000 | 1200 | 1600 | 2000 | 2400 | 2800 | 3200 | 3600 | 4000 |
| Tripping torque in %: Standard = 30 % | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Modulating actuator 2SA55 | | | | | | | | |
| 10 – 20 | | | 10 | 12 | 14 | 16 | 18 | 20 |
| 20 – 40 | | | 20 | 24 | 28 | 32 | 36 | 40 |
| 40 – 80 | | | 40 | 48 | 56 | 64 | 72 | 80 |
| 87 – 175 | | | 87 | 105 | 122 | 140 | 157 | 175 |
| 175 – 350 | | | 175 | 210 | 245 | 280 | 315 | 350 |
| 350 – 700 | | | 350 | 420 | 490 | 560 | 630 | 700 |
| 700 – 1400 | | | 700 | 840 | 980 | 1120 | 1260 | 1400 |
| 1400 – 2800 | | | 1400 | 1680 | 1960 | 2240 | 2520 | 2800 |
| Tripping torque in %: Standard = 50 % | | | 50 | 60 | 70 | 80 | 90 | 100 |

| Tripping forces for linear actuator 2SB5 | | | | | | | | |
|------------------------------------------|----------------------------------|--|------|-----|------|------|------|------|
| Tripping range | Possible values for setting [kN] | | | | | | | |
| 3.8 – 7.7 | | | 3.8 | 4.6 | 5.3 | 6.1 | 6.9 | 7.7 |
| 7.7 – 15.4 | | | 7.7 | 9.2 | 10.7 | 12.3 | 13.8 | 15.4 |
| 12.5 – 25 | | | 12.5 | 15 | 17.5 | 20 | 22.5 | 25 |
| 22.5 – 45 | | | 22.5 | 27 | 31.5 | 36 | 40.5 | 45 |
| 45 – 90 | | | 45 | 54 | 63 | 72 | 81 | 90 |
| 76 – 152 | | | 76 | 91 | 106 | 121 | 136 | 152 |
| Tripping force in %: Standard = 50 % | | | 50 | 60 | 70 | 80 | 90 | 100 |

| Tripping torques for part-turn actuator 2SC5 | | | | | | | | |
|----------------------------------------------|----------------------------------|------|------|------|------|------|------|------|
| Tripping range | Possible values for setting [Nm] | | | | | | | |
| Standard actuator 2SC50 | | | | | | | | |
| 150 – 250 | 150 | 200 | 250 | --- | --- | --- | --- | --- |
| 150 – 500 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
| 330 – 1100 | 330 | 440 | 550 | 660 | 770 | 880 | 990 | --- |
| 330 – 1100 | 330 | 440 | 550 | 660 | 770 | 880 | 990 | 1100 |
| 690 – 1840 | 690 | 920 | 1150 | 1380 | 1610 | 1840 | --- | --- |
| 690 – 2300 | 690 | 920 | 1150 | 1380 | 1610 | 1840 | 2070 | 2300 |
| 1440 – 3840 | 1440 | 1920 | 2400 | 2880 | 3360 | 3840 | --- | --- |
| 1440 – 4800 | 1440 | 1920 | 2400 | 2880 | 3360 | 3840 | 4320 | 4800 |
| Tripping torque in %: Standard = 30 % | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Modulating actuator 2SC55 | | | | | | | | |
| 175 – 330 | | | 175 | 210 | 245 | 280 | 315 | 350 |
| 385 – 770 | | | 385 | 462 | 539 | 616 | 693 | 770 |
| 800 – 1600 | | | 800 | 960 | 1120 | 1280 | 1440 | 1600 |
| 1800 – 3600 | | | 1800 | 2160 | 2520 | 2880 | 3240 | 3600 |
| Tripping torque in %: Standard = 50 % | | | 50 | 60 | 70 | 80 | 90 | 100 |

Setting

The tripping torques/forces for CLOSE are set via the middle potentiometer, for OPEN via the right of the three potentiometers. The setting range for the standard actuator ranges from 30 – 100 % and for the modulating actuator from 50 – 100 % of the maximum torque in 10 % steps each.

| Potentiometer | Function |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Setting in end position CLOSED of the</p> <ul style="list-style-type: none"> ■ tripping torques for rotary and part-turn actuators ■ tripping forces for linear actuators. <p>Setting: Turn potentiometer to the desired level (standard actuator 30 % – 100 %; modulating actuator 50 % – 100 %). For the setting values per level, refer to the table above.</p> |
|  | <p>Setting in end position OPEN of the</p> <ul style="list-style-type: none"> ■ tripping torques for rotary and part-turn actuators ■ tripping forces for linear actuators. <p>Setting: Turn potentiometer to the desired level (standard actuator 30 % – 100 %; modulating actuator 50 % – 100 %). For the setting values per level, refer to the table above.</p> |
| <p>In case no further settings are performed,</p> <ul style="list-style-type: none"> ■ set DIP switch S8 to ON and then to OFF again and ■ fit the cover of the electronics unit using screws. | |

5.3 Setting closing direction, cut-off modes

New actuators are set in the factory. Unless required otherwise by the customer, the default settings are as follows:

- closing direction: clockwise;
- cut-off mode in OPEN and CLOSE direction: travel-dependent;

If the current setting should be retained, continue with chapter 5.5 „Adjusting the signaling gear ratio and the end positions“.

The closing direction and the cut-off mode are set via DIP switches (see below).

5.3.1 Setting the closing direction

Unless required otherwise by the customer, the actuators are delivered with clockwise closing direction. If the output drive shaft has to turn counter-clockwise in CLOSE direction, the closing direction has to be changed.

If the current closing direction is to be retained, continue with chapter 5.3.2.



After each change of the closing direction, the end position setting has to be performed again.

Setting

| DIP switch | | Function |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------|
| | | CLOSE direction: counter-clockwise - output drive shaft turns counterclockwise. |
| | | CLOSE direction: clockwise - output drive shaft turns clockwise (default setting, unless required otherwise by the customer). |
| In case no further settings are performed at the DIP switch, <ul style="list-style-type: none"> ■ set DIP switch S8 to ON and OFF again (to accept the setting of the closing direction) ■ set the end positions, refer to the following chapter 5.5.3 | | |

5.3.2 Setting the cut-off modes

Cut-off mode

If the actuator operates, the cut-off mode can be travel-dependent or torque-dependent.

Travel-dependent cut-off mode

Travel-dependent cut-off means, the actuator trips once the valve has reached a defined position.

Torque-dependent cut-off mode







Torque-dependent cut-off means the actuator trips after reaching a pre-defined torque when moving into the end position range.

Default value for the cut-off mode of both end positions, OPEN and CLOSED, is travel-dependent. If the current values are to be retained, continue with chapter 5.3.3.



After each change of the cut-off mode, the end position setting has to be performed again.

Setting










| DIP switch | | Function |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|  |  ON | Cut-off mode end position CLOSED: travel-dependent (default setting, unless required otherwise by the customer). |
| |  OFF | Cut-off mode end position CLOSED: torque-dependent . |
|  |  ON | Cut-off mode end position OPEN: travel-dependent (default setting, unless required otherwise by the customer). |
| |  OFF | Cut-off mode end position OPEN: torque-dependent . |

In case no further settings are performed at the DIP switch,

- set DIP switch S8 to ON and OFF again (to accept the setting of the cut-off mode) and
- set the end positions, refer to the following chapter 5.5.3.

5.3.3 Selecting an output signal set

It can be defined which output signals are present at the 5 output signal outputs. Hereby it can be chosen between 4 output signal sets (consisting of predefined output signals for each of the 5 signaling outputs). The selection is made via the DIP switches S4 and S5.

| DIP switch | | | Signaling outputs | Level* | Output signals |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------|--------|-----------------------------|
|  | | | | | |
| S4 | | S5 | | | |
| Set 1 |  OFF |  OFF | 1 | NO | Travel OPEN |
| | | | 2 | NO | Travel CLOSE |
| | | | 3 | NC | Torque OPEN/CLOSE |
| | | | 4 | NO | Torque OPEN/CLOSE |
| | | | 5 | NC | Warning motor temperature** |
| Set 2 |  ON |  OFF | 1 | NO | End position OPEN |
| | | | 2 | NO | End position CLOSED |
| | | | 3 | NO | Blinker |
| | | | 4 | NO | Ready + REMOTE |
| | | | 5 | NC | Warning motor temperature** |
| Set 3 |  OFF |  ON | 1 | NO | End position OPEN |
| | | | 2 | NO | End position OPEN |
| | | | 3 | NC | Fault |
| | | | 4 | NO | Ort |
| | | | 5 | NC | Warning motor temperature** |
| Set 4 |  ON |  ON | 1 | NO | Travel OPEN |
| | | | 2 | NO | Travel CLOSE |
| | | | 3 | NO | Ready + REMOTE |
| | | | 4 | NC | Torque OPEN |
| | | | 5 | NC | Torque CLOSE |

In case no further settings are performed,

- set DIP switch S8 to ON and then to OFF again and
- fit the cover of the electronics unit using screws.

*NO = normally open contact (active high DC 18 – 30 V), NC = normally closed contact (active low DC 0 – 4 V). The active high or active low levels are set when a status is reached.

**for 2SG5... „Motor temperature too high“

5.3.4 Setting remote control

Depending on the version, there are different options for the DCS to control the actuator. Either via „pulse contact“ or „permanent contact“.

Pulse contact




After an OPEN/CLOSE pulse, the actuator operates until a STOP command is present or the end position has been reached. A signal for the opposite direction leads to a direct change of the direction of operation.

The pulse contact function is also called self-retaining.

Permanent contact

The actuator operates as long as an OPEN or CLOSE signal is present. The actuator stops, if the signal is deactivated, the end position has been reached or the OPEN and CLOSE commands are present simultaneously.

Setting

| DIP switch | | Function |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|  |  ON | Control mode „Remote“ Pulse contact . |
| |  OFF | Control mode „Remote“ Permanent contact (default setting, unless required otherwise by the customer). |
| In case no further settings are performed, <ul style="list-style-type: none"> ■ set DIP switch S8 to ON and then to OFF again and ■ fit the cover of the electronics unit using screws. | | |



If the control is to be performed via PROFIBUS, this control mode has to be set with the COM-SIPOS PC parameterization program (click on **Remote control** in the **Input/output** menu).

5.4 Other valve-specific settings via COM-SIPOS

Other parameters can be set using the COM-SIPOS PC parameterization program. Some are described in the following. For further information refer to chapter 4.4.

Retry torque block

If the actuator is blocked in move (block outside the end position ranges) the actuator is tripped and a sum fault is set. The actuator continues to signal „ready“ since it can still be operated into the opposite direction.

If the value for the „retry torq.block“ parameter is not equal to zero, the actuator is automatically operated into the opposite direction once a block has been detected and then again in the direction of the block. The partial stroke for this opposite movement will be corresponding to the setting of the end position range it was moving to, but not longer than 2 seconds. Then the movement reverses automatically back. This happens until the block has been overcome or the programmed number of tries has been reached.

Default setting is 0.

Motor temperature warning

A warning is issued once the motor temperature has reached a preset value. A value between 0 and 155 °C can be set.

The warning signal can be provided via binary signal and fieldbus protocol.

Default value is 135 °C.

This parameter is not available for the part-turn actuator 2SG5.

Motor heating

To prevent condensation while the motor is at standstill, the motor can be heated with DC current when the heater is activated. The heating up depends on the difference between motor temperature and ambient temperature.

The heater is switched off as standard.

If exposed to strong climatic fluctuations, the actuator should be operated with the motor heater switched on.



Motor temperature protection

The motor is equipped with full electronic motor protection against thermal damage. The motor protection is activated in the factory.

5.5 Adjusting the signaling gear ratio and the end positions



If actuators are delivered mounted to a valve, this step has been done in the valve manufacturer's factory. The setting has to be checked during commissioning.



For the part-turn actuator 2SG5..., the signaling gear ratio does not have to be set. The actuator is not equipped with an adjustable signaling gear. Continue with chapter 5.5.3.

5.5.1 General

By setting the signaling gear ratio and the end positions, it is ensured that the length, as well as start and end of the valve travel (end positions OPEN and CLOSED) are correctly signaled to the electronics.

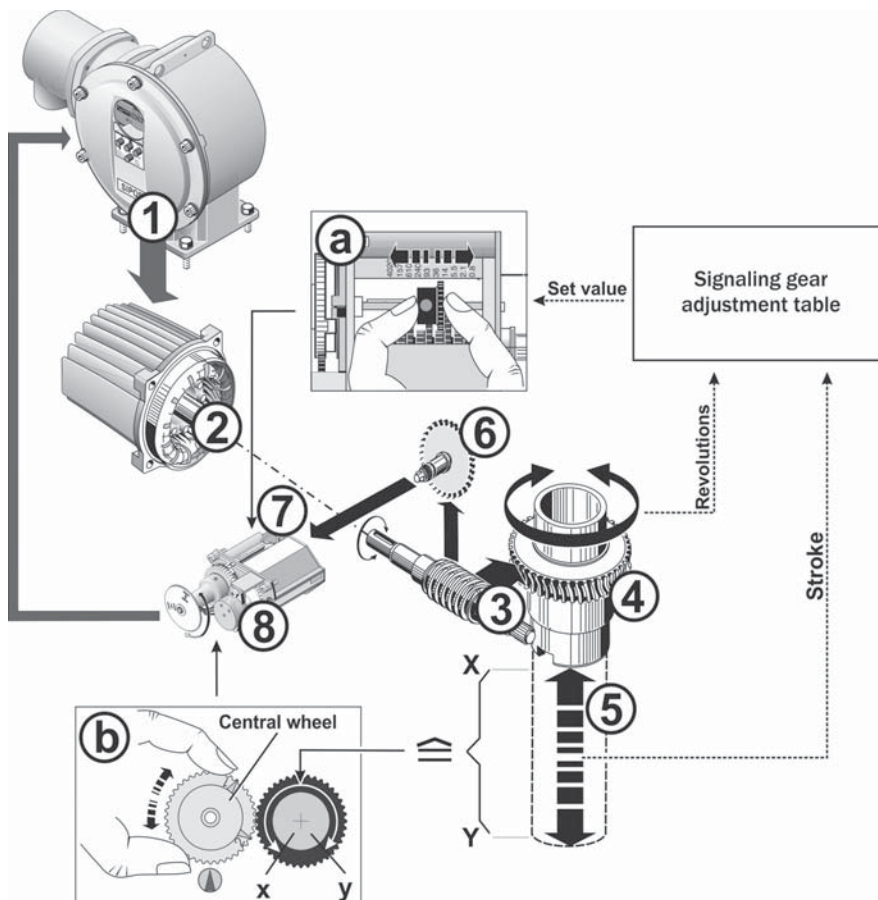


Fig.: Schematic representation of the signaling gear ratio and end position settings

Explanation

The signaling gear (7) reduces the rotations of the output shaft (4) required for the complete travel [(5) X – Y] to a rotary movement of less than a full revolution (max. rotation angle of the potentiometer or the magnetic position sensor (x - y) (Setting (a), refer to following chapter, „Adjusting the signaling gear ratio“).

From the position of the potentiometer or the magnetic position sensor (for reasons of simplicity, only called potentiometer in the following), the electronics recognizes the position of the output drive shaft and therefore the position of the connected valve.

To this end, the potentiometer has to be set so that one of the mechanical end positions of the valve (X or Y) corresponds to one limit of the electric setting range of the potentiometer (x or y) (Setting (b), refer to the following chapter „Adjusting the end positions“).

5.5.2 Adjusting the signaling gear ratio

The number of rotations required to cover the whole travel must be known. The data is provided by the valve manufacturer. If this information is not available, see note below. For the required setting of the signaling gear, refer to the „Signaling gear adjustment“ table below.

Intermediate values of rev/stroke or travel (mm) or degrees are rounded up to the **next incremental** value (e.g. for 30 rev/stroke, the incremental value 36 has to be set).

| Signaling gear adjustment | | | | | | | | | | | | |
|-------------------------------------------------------------|------------------|-------------|--------------|------|------|--------------|------------|------|-----|-----|------|------|
| Type | | Unit | Valve travel | | | | | | | | | |
| Rotary actuator | 2SA5.1/2/3/4/5/6 | Rev./stroke | 0.8 | 2.1 | 5.5 | 14 | 36* | 93 | 240 | 610 | 1575 | 4020 |
| | 2SA5.7/8 | | 0.2 | 0.52 | 1.37 | 3.5 | 9 * | 23.2 | 60 | 152 | 393 | 1005 |
| Linear actuator | 2SB551/2 | mm/travel | 4 | 10.5 | 27.5 | 70* | 180 | 465 | | | | |
| | 2SB553 | | 4.8 | 12.6 | 33 | 84* | 216 | 558 | | | | |
| | 2SB554/5 | | 5.6 | 14.7 | 38.5 | 98* | 252 | 651 | | | | |
| | 2SB556 | | 6.4 | 16.8 | 44 | 112* | 288 | 744 | | | | |
| Part-turn actuator | 2SC5.1/2/3/4/5/6 | Degrees | | | | 90° * | 120/240° | 360° | | | | |
| 10 possible settings at the signaling gear (scale) → | | | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |
| | | | 0.8 | 2.1 | 5.5 | 14 | 36 | 93 | 240 | 610 | 1575 | 4020 |
| *Default setting, unless required otherwise by the customer | | | | | | | | | | | | |



If the number of revolutions per stroke is not known, because, for example, the actuator is to be operated on an available „old“ valve, operate the actuator over the whole travel and note the number of revolutions of the output drive shaft.

If it is not possible to watch the output drive shaft, skip this chapter. Observe the note on the signaling gear in the „Prerequisite for end position adjustment“ section in chapter 5.5.3, „Adjusting the end positions“.

Procedure

1. Loosen 4 screws (item 1) from the signaling gear cover and remove cover.
2. Round up revolutions/stroke or mm/travel or de-grees to the next incremental value(for incremental values refer to table above).
3. Adjust the slide wheel (2) so that the gear rim faces the desired incremental value on the scale: Push the slide wheel in the right direction, applying only little pressure. Adjusting the slide wheel is facilitated by a slight movement of the central wheel (3).

Do not yet fit the signaling gear cover.

The end positions have to be set and, if available, the mechanical position indicator.

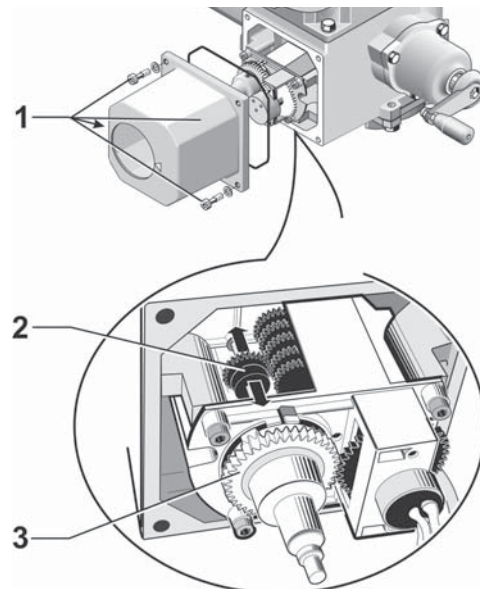


Fig.: Adjusting the signaling gear ratio

5.5.3 Adjusting the end positions

The end positions are set directly at the actuator.

Prerequisite for end position adjustment

- The valve must not be jammed. Use the hand crank /hand wheel to release it, if necessary. For the operation of the hand crank refer to chapter 4.
- The signaling gear should be set, refer to previous chapter „Adjusting the signaling gear ratio“. If the signaling gear ratio was not set because the number of revolutions/stroke is not known, proceed nevertheless as described in the following. Observe the note for operation step 11.
- Settings at the DIP switches “S1” - “S6” must be completed prior to setting the end positions and may not be modified during this end position setting process.



- The end position setting (OPEN and CLOSED) will only become effective after DIP switch S7 was switched ON and OFF again.
- As long as position of the central wheel (friction coupling) was not altered and/or the DIP switch S7 not operated, the setting of the end positions may be canceled by resetting the DIP switch S8 to OFF.
- The end positions have to be set in a specific order. The OPEN end position must be set first!

Operation during the end position setting

The end positions are set while the cover of the electronics unit is removed. When the electronics unit cover is removed, the actuator is operated via the push buttons on the electronics board, see figure, items 3 to 6).

- 1 LED H1 (green)
- 2 LED H2 (red)
- 3 CLOSE button
- 4 OPEN button
- 5 Push button for selection between local/remote
- 6 STOP button

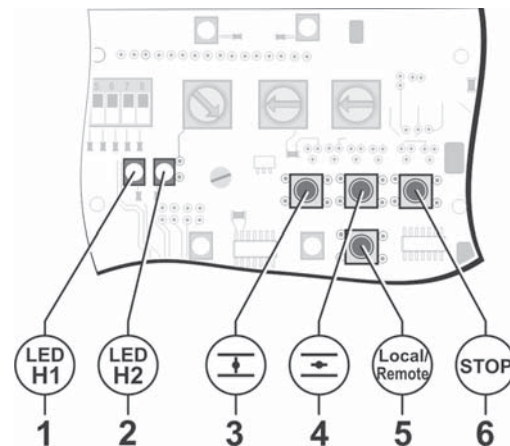


Fig: Arrangement of the push buttons on the electronics board

LED signals


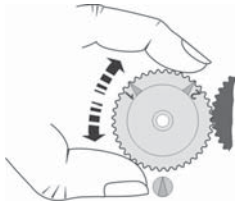






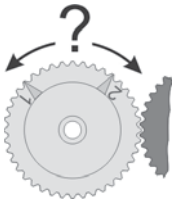
When setting the end positions, the LEDs H1 (green) and H2 (red) indicate the current status of the actuator by being illuminated and/or flashing.

The following description „operation sequence“ presents the possible states of the LEDs (not illuminated – illuminated – flashing) as shown on the right:

| | |
|--|--------------------------------------------------------------------------------------------------------------------------|
| | = LED is not illuminated |
| | = LED is illuminated |
| | = LED is flashing |
| | = LED flashes periodically: 3 x 3 flashes + pause = 1 period |
| | = Only applies to LED H2 (red) when setting the end positions: It is not important whether the LED is illuminated or not |




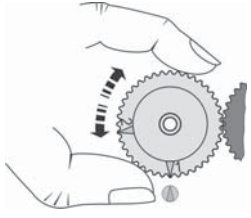









Should the indicated LED pattern differ from the representation in the following „operation sequence“ description, an error or a fault has occurred (refer to the „Status and fault signals“ chapter).

Operation sequence

| Instruction | DIP switch/ push button | LED | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| | | H1 | H2 |
| 1. If the signaling gear cover is fitted, unscrew cover. | | | |
|  Important: Turn central wheel until marks 1 and 2 point in upward direction, see illustration on the right. | | |  |
| 3. If the cover of the electronics unit is not removed, unscrew cover. | | | |
| 4. Switch actuator to the „Local“ state. | | | |
| 5. Set DIP switch S8 to ON. |  |  |  |
| LED H1 (green) is flashing, LED H2 (red) is illuminated for invalid end position setting. | | | |
| 6. End position OPEN is set first. | | | |
| Depending on whether the tripping in end position OPEN is | | | |
| – travel-dependent (DIP switch S3 = ON, see also chapter 5.3.2 „Setting the cut-off modes“) or | | | |
| – torque-dependent (DIP switch S3 = OFF), the following operation sequence has to be selected accordingly. | | | |
| – Travel-dependent cut-off mode | | | |
| d) Observe the valve position and operate the actuator using the OPEN button until the valve has reached end position OPEN. ¹ |  |  |  |
| Note: When pressing the CLOSE or OPEN buttons for a short time (< 2 s), the actuator is operated as long as the push button is pressed. When held down for a longer time, the actuator operates, until the STOP (ENTER) button or the button for the opposite direction is pressed. | | | |
| Important: When approaching to the end position, observe the direction of rotation of the central wheel. This is important for operation step 7. (Press CLOSE button to return to the desired end position). Continue with operation step 7. | | | |
| | | |  |



¹ If the actuator has switched off automatically before reaching the end position, two causes are possible:

- Sluggish MOV or unfavorable torque curve. In this case, cancel procedure: Set DIP switch S8 to OFF, or
- valve has reached the mechanical stop, in this case return to desired end position.

| Instruction | DIP switch/ push button | LED | H1 | H2 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----|
| <p>– Torque-dependent cut-off mode: Hold down OPEN button for more than 2 s. The actuator operates automatically.</p> <p>When reaching the end position range, the permanent signal of LED H2 changes to a periodical flashing signal.</p> <p>After reaching the end position, the actuator operates shortly in the opposite direction, to return to the end position again. As soon as the actuator has stopped automatically, the blink signal of LED H2 changes over to a permanent signal. (for 2SG5 continue with step 8).</p> |  |  |  | |
| <p>7. Slowly turn the central wheel shortly before mark 1 or 2 until LED H2 (red) is no longer illuminated. To which mark (1 or 2) depends on the rotation direction of the central wheel when approaching the end position (see „important“ in step 6.):</p> <ul style="list-style-type: none"> – counter-clockwise: adjust to mark 1, – clockwise: adjust to mark 2. <p>If the central wheel has already reached the end-stop, turn in the opposite direction.</p> |  |  |  | |
| <p>8. Confirm the setting of end position OPEN</p> <p>set DIP switch S7 ON and then to OFF again. LEDs H1 and H2 are blinking.</p> <p>The first end position is set and therefore, the potentiometer or the magnetic position sensor are adjusted. The system changes over to setting the other end position.</p> |  |  |  | |
| <p>9. If the actuator is equipped with a mechanical position indicator, we recommend setting it now. Separate approaching of the end position can thereby be avoided. For the setting, refer to the following chapter 5.3.4.</p> |  | | | |
| <p>10. Now set end position CLOSED.</p> <p>Depending on whether the tripping in end position CLOSED is</p> <ul style="list-style-type: none"> – travel-dependent (DIP switch S2 = ON, see also chapter 5.3.2 „Setting the cut-off modes“) or – torque-dependent (DIP switch S2 = OFF), the following operation sequence has to be selected accordingly. | | | | |
| <p>– Travel-dependent cut-off mode Use the CLOSE button to operate the actuator until the valve has reached the end position. Pay attention to the valve during operation! Continue with operation step 11.</p> |  |  |  | |
| <p>Note: If the actuator trips torque-dependently prior to reaching the end position due to a block, e.g. in case of a sluggish MOV, an unfavorable torque curve or approaching a mechanical end stop, press the OPEN button to return to the desired end position.</p> | | | | |



5.5.4 Adjusting the mechanical position indicator

The mechanical position indicator indicates the valve position. The green symbol stands for  OPEN and the red symbol for  CLOSED (refer to illustration).

The mechanical position indicator is an option, and not included in all devices.



If the actuator was delivered mounted on a valve, the setting was already performed by the manufacturer. However, the setting must be checked during commissioning.

If the mechanical position indicator was not yet set with the end positions, set the indicator as follows.

Operation sequence

1. Operate the actuator into the end position CLOSED.
2. Remove signaling gear cover.
3. Turn white disc with red symbol (fig. item 2) until the symbol for CLOSED and the arrow (3) are aligned in the indicator glass of the cover.
4. Operate actuator to position OPEN.
5. Hold white disc in position and turn transparent disc (1) so that the green symbol for OPEN and the arrow (3) are aligned.
6. Fit signaling gear cover with screws.

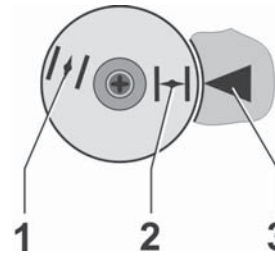


Fig. 1: Symbols at position indicator

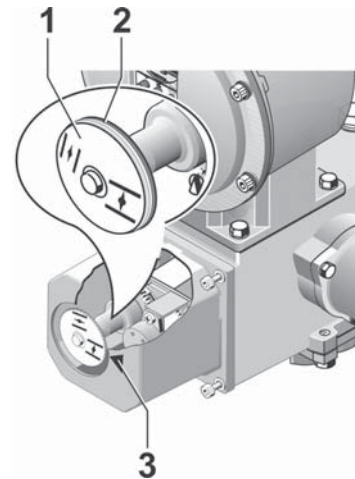


Fig. 2: Setting the position indicator

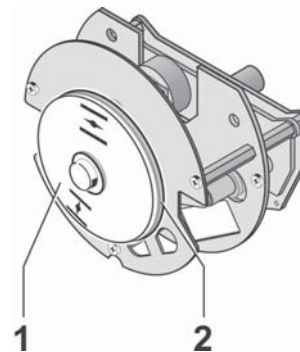


Fig. 3: Position indicator 2SG5

6 Status and fault signals

LEDs H1 and H2 signal the device status and the fault signals. This enables a fault analysis. Some of the fault signals can be reset, refer to right column „fault type“ in the following table.

The letters below have the following meanings:

- S – self-resetting fault signals
Once the cause of the fault is eliminated, the fault signal is automatically reset.
- R – resettable fault signals
Fault signal remains present even after eliminating the cause of the fault until it has been finally acknowledged (S8 ► ON ► OFF).
- N – Non-resettable fault signals
The cause of the fault must be eliminated.

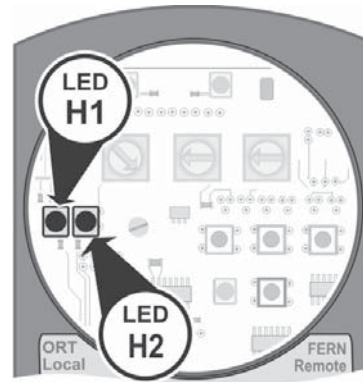


























Fig.: LEDs H1 and H2

The following table shows the status of the LEDs H1 and H2, the respective meaning as well as the corrective measures. The states of the LEDs (off – on – blinking) are represented as follows:

- = LED is not illuminated
- = LED is illuminated
- = LED is flashing continuously
- 3 x = LED flashes periodically. The flashing, here 3 times, is repeated after a pause of 1 s: 3 flashes + pause = 1 period

| LED | | Meaning | Corrective measures | Fault type |
|---------------|-------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| H1 (green) | H2 (red) | | | |
| | | Actuator does not react to commands from remote or to push-buttons locally | Slide BOOT switch (1) to OFF position (= away from "BOOT") and press RESET (2) | |
| | | The actuator is ready for operation | | |
| | | Fault: Device failure | Service, repair necessary | N |
| | | Fault: Commissioning is invalid | Perform commissioning | N |
| | 2x | Fault: Motor temperature too high | <ul style="list-style-type: none"> ■ Check valve for sluggishness ■ Reduce number of starts ■ Ambient temperature impermissibly high ■ Verify "Separate mounting" parameter via COM SIPOS parameterization program | S |
| | 3x | Fault: Mains failure or excessive mains voltage fluctuations | Check supply voltages | S |

6
Status and fault signals

| LED | | Meaning | Corrective measures | Fault type |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| H1 (green) | H2 (red) | | | |
|  |  | Fault: Open-circuit of ■ travel potentiometer or temperature sensor ■ cables from REMOTE | <ul style="list-style-type: none"> ■ Check cables of separate mounting kit ■ Check input cables (fieldbus, if applicable) | R |
|  |  | Fault: Blocked in move, i.e. tripping torque reached within the travel (outside end position ranges) | <ul style="list-style-type: none"> ■ Check valve for sluggishness ■ Set higher torque values ■ Verify "Separate mounting" parameter via COM SIPOS parameterization program | S |
|  |  | Fault: ■ End positions were exceeded ■ Fault during runtime monitoring | <ul style="list-style-type: none"> ■ Recommissioning ■ Check signaling gear and travel potentiometer ■ Check valve for sluggishness ■ Set higher torque values ■ Verify "Separate mounting" parameter via COM SIPOS parameterization program | N |
|  |  | Commissioning active: End position setting not OK | --- | --- |
|  |  | Commissioning active: End position setting not OK | Terminate commissioning and perform it once again (S8 ► OFF ► ON) | N |
|  |  | Commissioning active: End position OPEN is set, approach end position CLOSED! | --- | --- |
|  |  | Commissioning active: Commissioning not possible | Terminate commissioning (S8 ► OFF) and evaluate flash pattern | N |
|  |  | Commissioning active: Actuator moves automatically with torque-dependent cut-off mode to the end position | --- | --- |
|  |  | Hand wheel/crank operated | <ul style="list-style-type: none"> ■ Release hand wheel/crank ■ Check cables of separate mounting kit | S |
|  |  | Commissioning active: Hand crank/hand wheel operated during commissioning | Release hand wheel/crank | S |
|  |  | Commissioning active: Commissioning via serial interfaced or fieldbus interface active, i.e. on-site commissioning and operation via local control unit not possible | --- | --- |
|  |  | Change-over from REMOTE to LOCAL blocked | Enable via PROFIBUS | S |

7 Maintenance, inspection, service

Before any work is carried out on the actuator, ensure that

- the planned measures (possible operation of valves, etc.) will not result in injury to persons or faults in the plant,
- the actuator or plant section is properly isolated. In addition to the main circuits, also check that any additional or auxiliary circuits are disconnected!
- Furthermore, the general safety regulations have to be observed:
 - Disconnect all poles (also 24 V DC),
 - Prevent accidental reconnection,
 - Confirm that equipment is not live,
 - Earth and short-circuit equipment,
 - Fit barriers or covers to neighboring live components.

7.1 General

The actuators are virtually maintenance-free (for the lubrication intervals, refer to chapter 7.2).

We recommend submitting the actuators to a general inspection after commissioning or after approx. 50 operation hours to verify that

- correct functioning is guaranteed,
- no unusual noises/vibration occur,
- the fixing elements have not become loose,
- no leakages occur.

The housing of the SIPOS 5 actuators consists of an aluminum alloy which is corrosion resistant under normal environmental conditions. If the paint was damaged during assembly, it can be touched up with original paint supplied in small quantity units by SIPOS Aktorik.

This list cannot cover every eventuality. Further checks may be necessary in accordance with the plant-specific conditions. Any impermissible deviations or changes detected during inspection must be rectified immediately.

Under normal operation conditions, service or inspection of the devices is recommended every 8 years. The lubricant in the gear enclosure has to be changed, the seals have to be exchanged and all parts within the direct flux of force have to be checked for wear; depending on the operation conditions, shorter maintenance intervals may be required.

This is especially important for actuators in high-temperature version - additional order code T09. These must be inspected every two years by the SIPOS-Service and wear parts must be replaced!



It is recommended that the services of the local SIPOS Aktorik service center are utilized for this purpose.

Please contact **SIPOS Aktorik GmbH** for any service requests. You can find the address and the phone number of your competent contact at **www.sipos.de**. You may also send your requests directly via e-mail to **service@sipos.de**.

7.2 Lubrication intervals and lubricants

7.2.1 Lubrication intervals

Perform service or inspection after **approx. 8 years** (refer to chapter 7.1).

After 50 operating hours or 1 year, regrease coupling shaft A, if available, at the greasing nipple.



For output shaft form A, ensure that the valve stem is greased separately!

These intervals are valid for normal load. When exposed to more intensive loads, the maintenance intervals are reduced accordingly.

Actuators in high temperature version – additional order code T09 - must be inspected every two years by the SIPOS-Service and wear parts must be replaced!



Whenever the covers and hoods are removed, the seals must be inspected for damage. Replace and regrease if necessary.

7.2.2 Lubricant assignment and quantity

| | | Actuator type | | |
|---------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------|
| | | 2SA5.1/2 | 2SA5.3/4 | 2SA5.5/6/7/8 |
| | | 2SB551/2 | 2SB553/4 | 2SB555/6 |
| | | 2SC501/2/3/4, 2SC551/2 | 2SC505/6, 2SC553/4 | - |
| Gear oil | Lubricant quantity | 760 cm ³ | 1600 cm ³ | 2400 cm ³ |
| | Filling level ¹ | max. 46 mm | max. 58 mm | 23 – 27 mm |
| | Lubricant ² | Klübersynth GH 6 – 220 N (Klüber)) or Alphasyn PG 220 Polyglycol (Castrol), Berusynth EP 220 (Bechem), Panolin EP gear synth 220 (Kleenoil). | | MOBIL SHC Gear 220 ^{3,4} (refer to identification at the equipment) |
| | | | | |
| Grounding connections (inside) | Lubricant quantity | 1 cm ³ | | |
| | Lubricant ² | Petroleum jelly (DAB 10) V10 | | |
| Other lubrication points ⁵ | Lubricant quantity | 50 cm ³ | | |
| | Lubricant ² | Grease AR1 (ZEPF) | | |
| Output shaft form A (2SA5) | Lubricant quantity | 2 cm ³ | | |
| | Lubricant ² | Commercial ball bearing grease | | |
| Thrust unit for 2SB5... | (The recommendations for the actuators should also be observed here.) | | | |
| Part-turn unit for 2SC5... | | | | |
| Part-turn gearbox for 2SG5... | | | | |



- The manufacturer's instructions and relevant regulations are to be observed when handling and disposing of lubricants. Technical information concerning lubricants is available on request.
- Before using an alternative new lubricant (other than that filled in the factory), the gear units and gear parts have to be rinsed and cleaned (avoid mixing of the oils).

¹ Measured from the lubricant surface to the external earth of the housing at oil filling screw.

² Ambient temperature range –20 – +60 °C.

³ Lubricant used in the factory.

⁴ Filling of the actuators:

- until approx. October 2004 with Klüber Syntheso D 220 EP,
- until approx. October 2011 with Mobilgear SHC XMP 220.

⁵ e.g. sealing rings, gear systems, bearings, feather keys, bright surface etc.

⁶ If applied

8 Spare parts

8.1 General

With the exception of standardized, generally available components, only original spare parts may be used. Spare parts are usually supplied as complete subassemblies (see the list below). In the following representation drawings, designations with 3 digits are listed. These numbers are prefixed with „2SY5“ to give the full spare parts designation.

When ordering spare parts, always provide the following information:

1. Order number and works number of the actuator (refer to rating plate),
2. Spare parts designation 2SY5 . . . (see following list),
3. Quantity required.



- All external metallic housing parts are made of a corrosion resistant aluminum alloy, painted with color similar to RAL 7037 (silver-gray) as standard and meet the requirements up to corrosivity category C5
- Other finish paint color ► add. order code **Y35**
- Very high corrosion protection
corrosivity category C5 with long protection time ► add order code **L38**

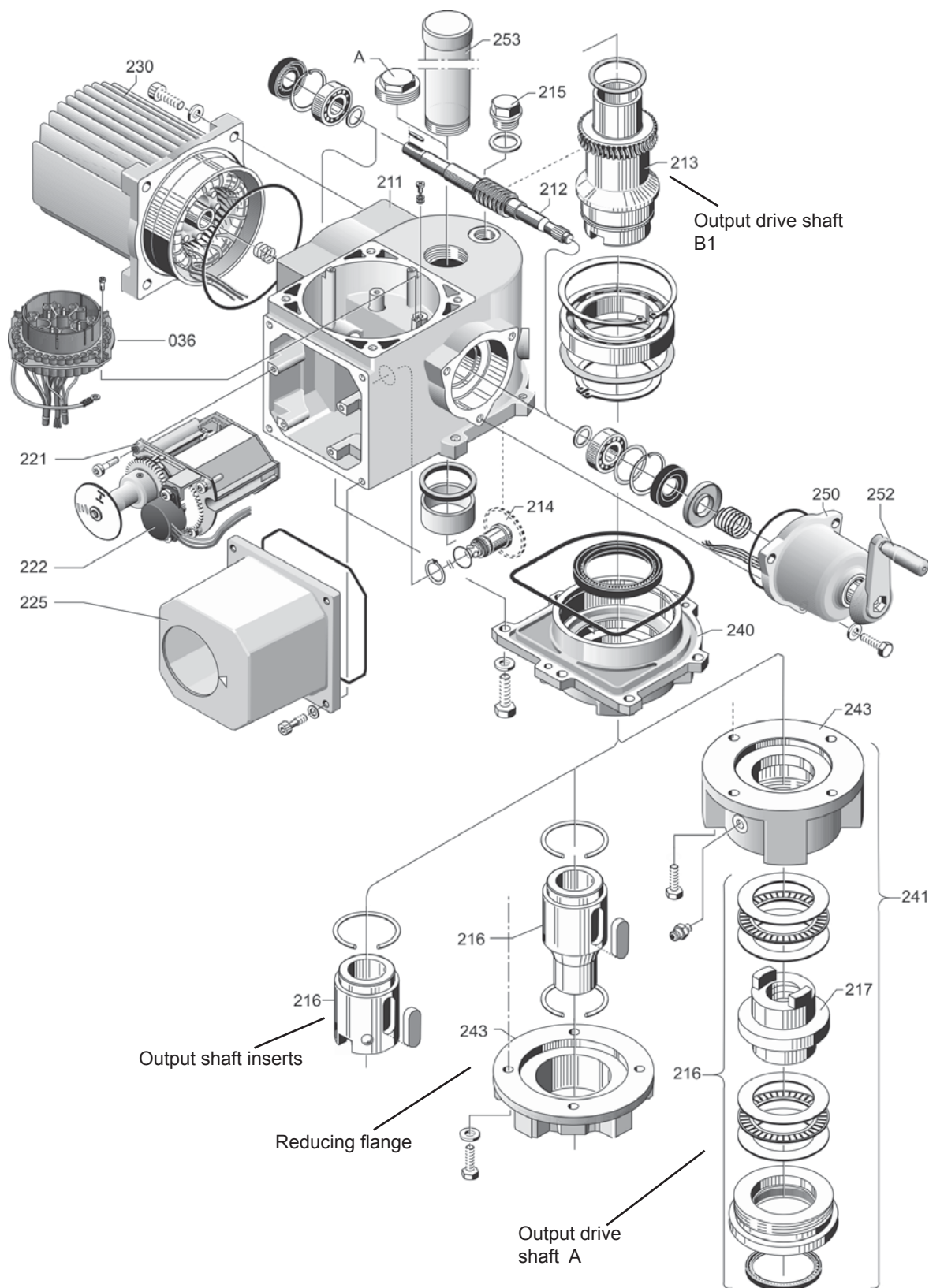
8.2 Spare parts list

Our actuators are designed for fault-free operation within the maintenance intervals. As we know from experience, external causes, may damage the actuator already during the commissioning stage. For such events, the recommended spare parts are listed in the following table. If you require other parts, please contact our service.

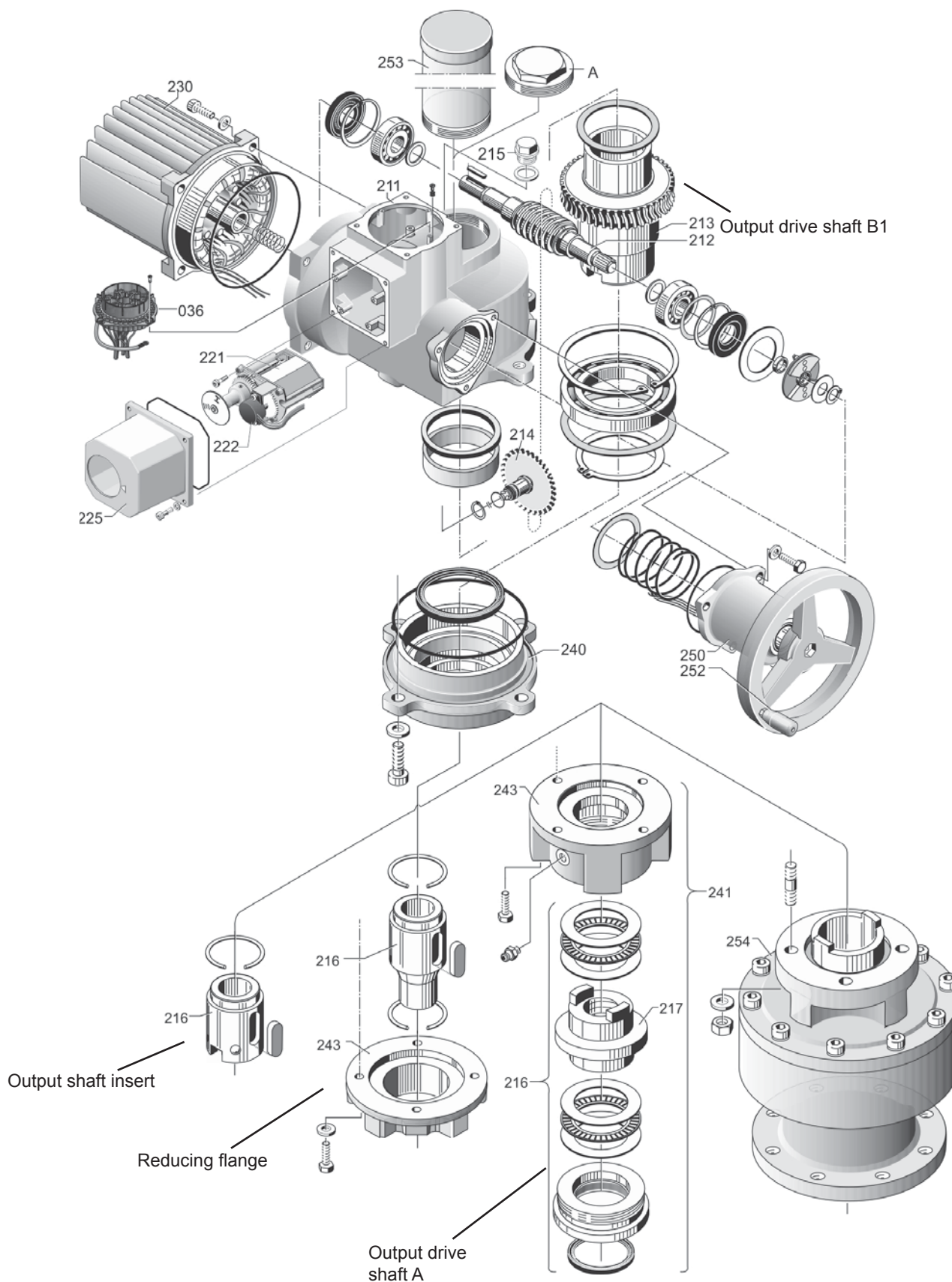
| No. | Designation |
|---------|--------------------------------------------------------------------------|
| 2SY5001 | Electronics unit (012 – 042) |
| 2SY5041 | Cover for electronic housing |
| 2SY5055 | Terminal plugs (X1, X2.1, X2.2, X3.1, X3.2) |
| 2SY5216 | Output shaft insert, output shaft form „A“: |
| 2SY5218 | Set of seals (without illustration) |
| 2SY5220 | Signaling gear complete (221, 222) |
| 2SY5225 | Signaling gear cover |
| 2SY5250 | Manual drive |
| 2SY5250 | Handle/hand crank with handle |
| ▲▲▲ | = The last three digits indicate the part numbers in the exploded views. |

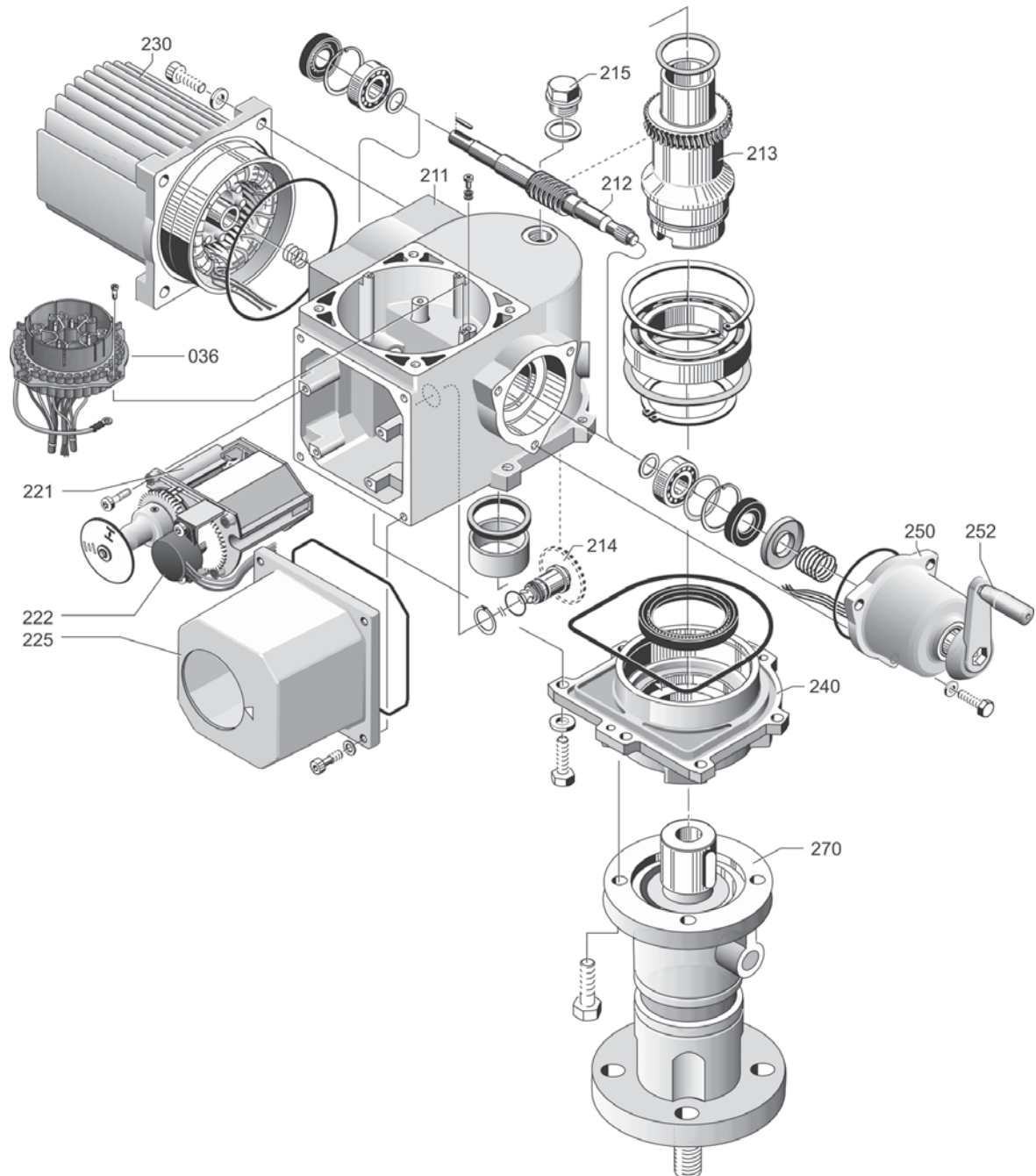
8.3 Exploded views

8.3.1 Gear unit 2SA5 1/2/3/4.-

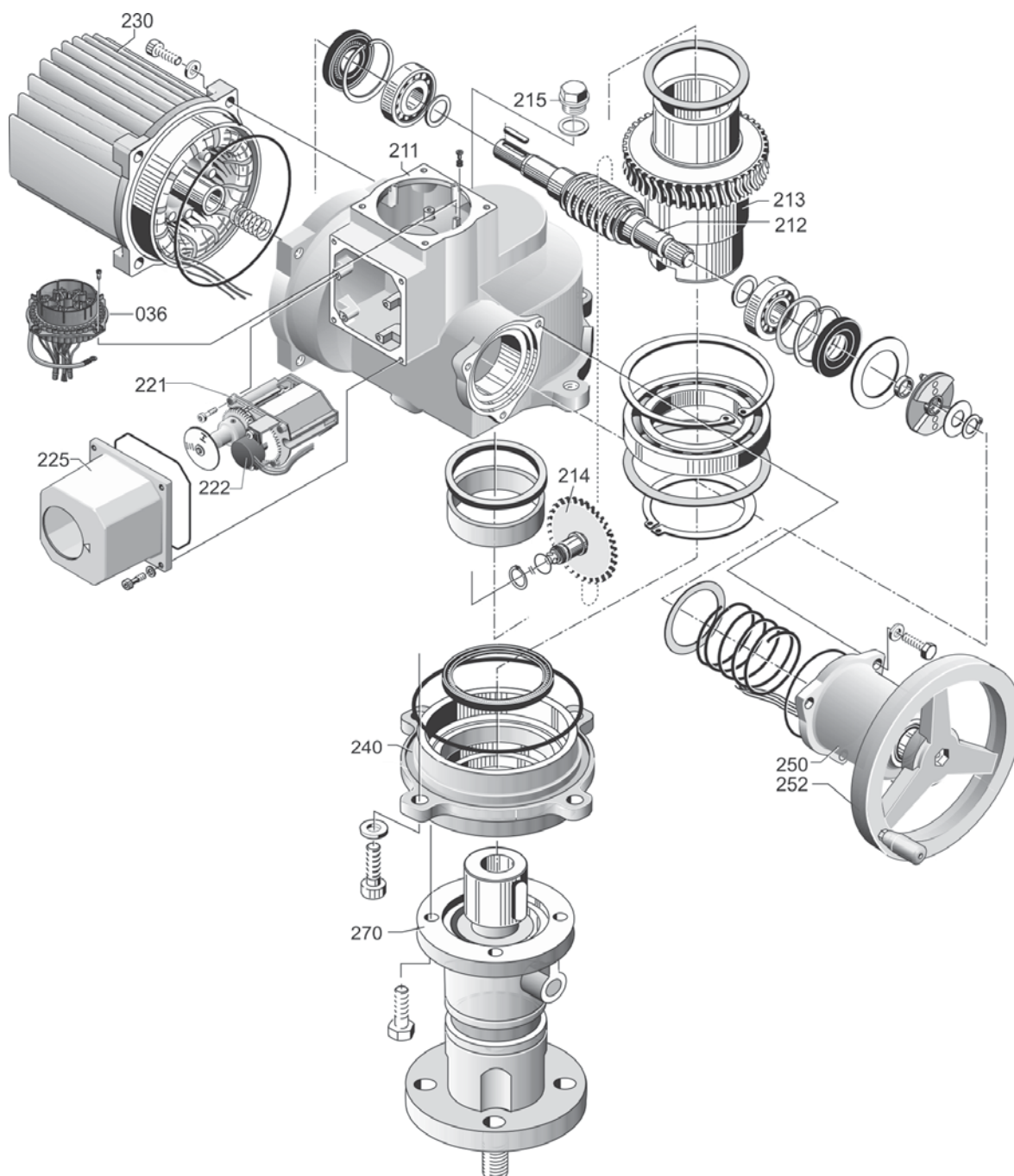


8.3.2 Gear unit 2SA5. 5/6/7/8.-

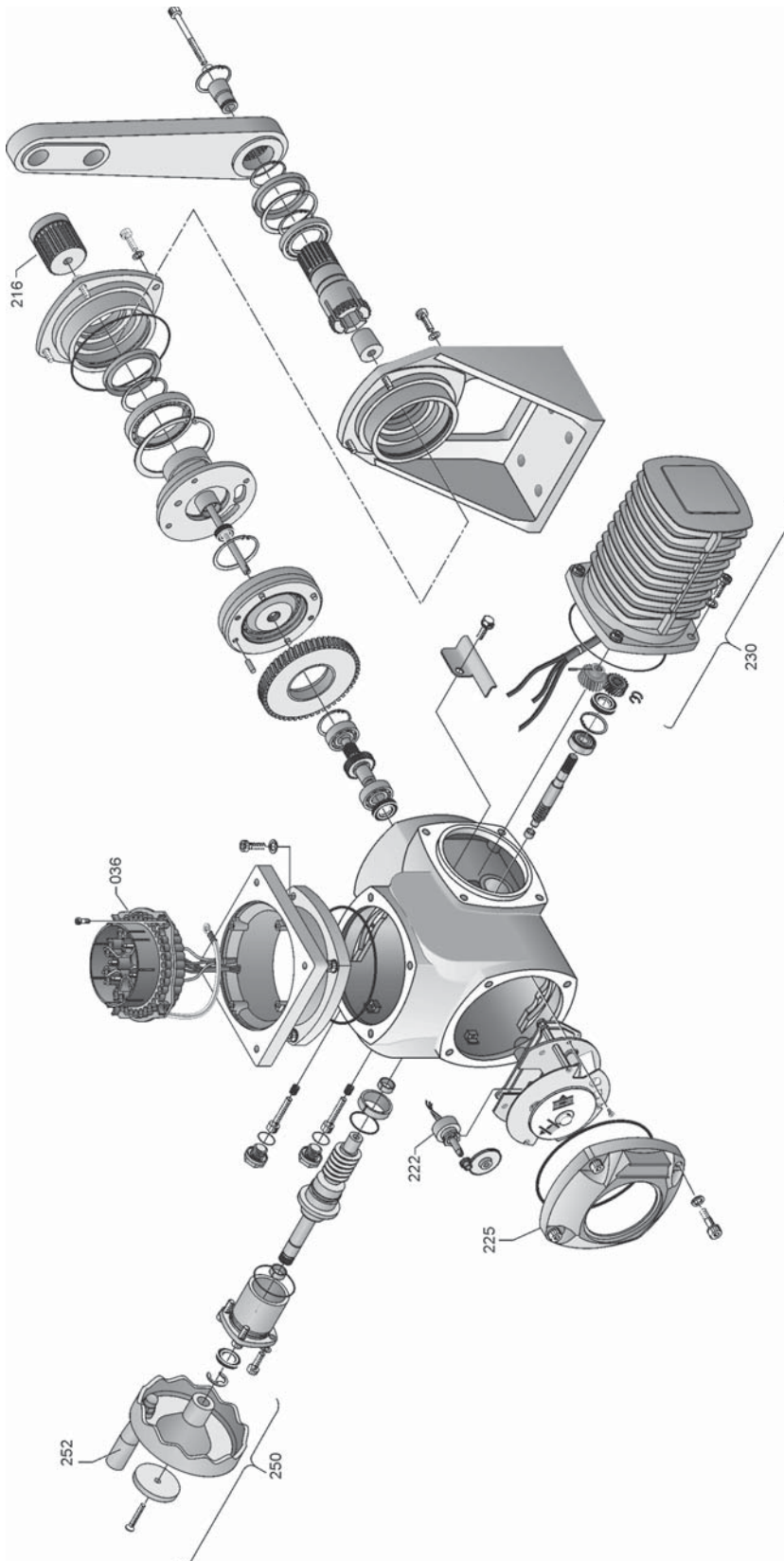


8.3.3 Gear unit with thrust unit 2SB551/2/3/4.-

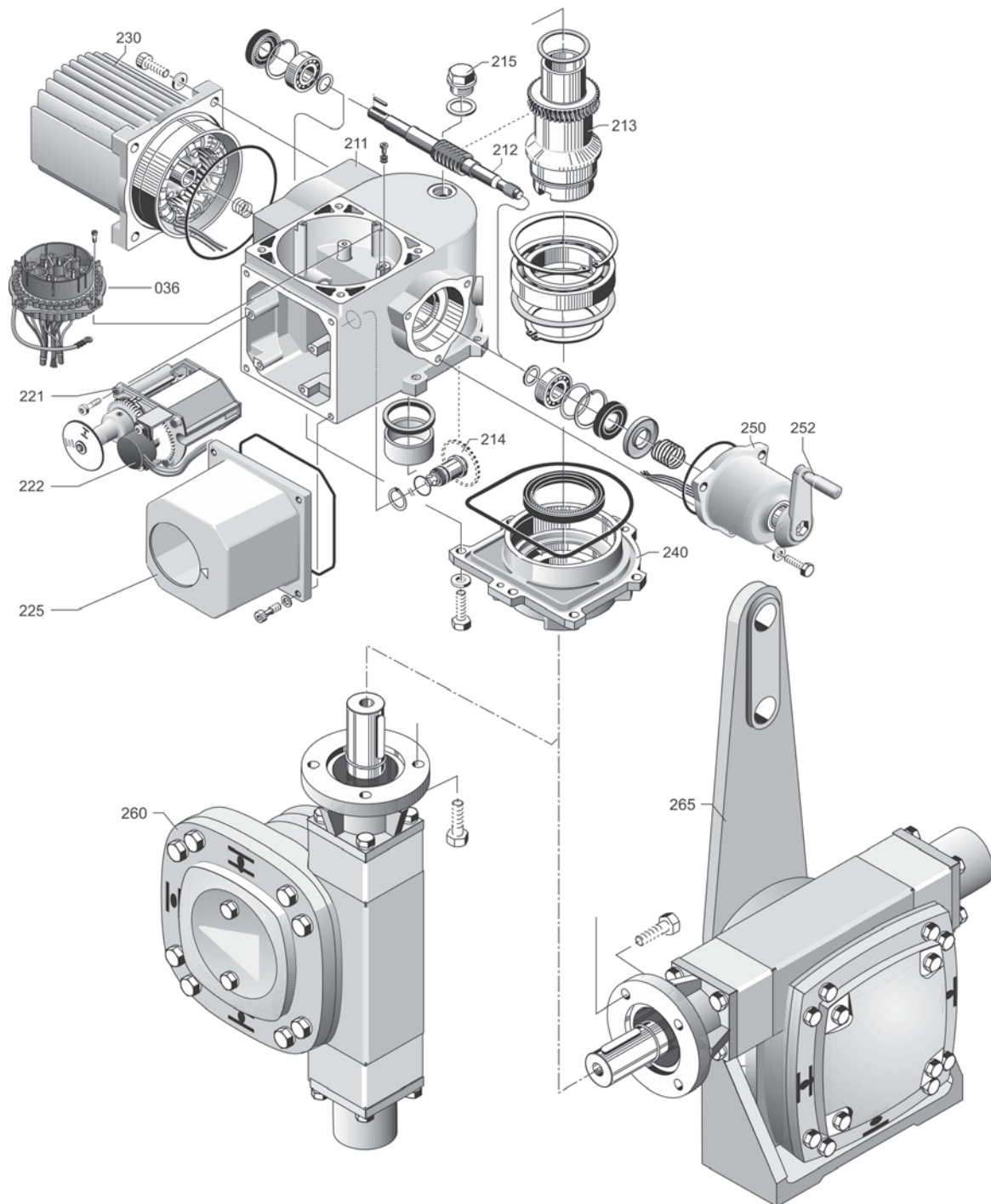
8.3.4 Gear unit with thrust unit 2SB555/6.-



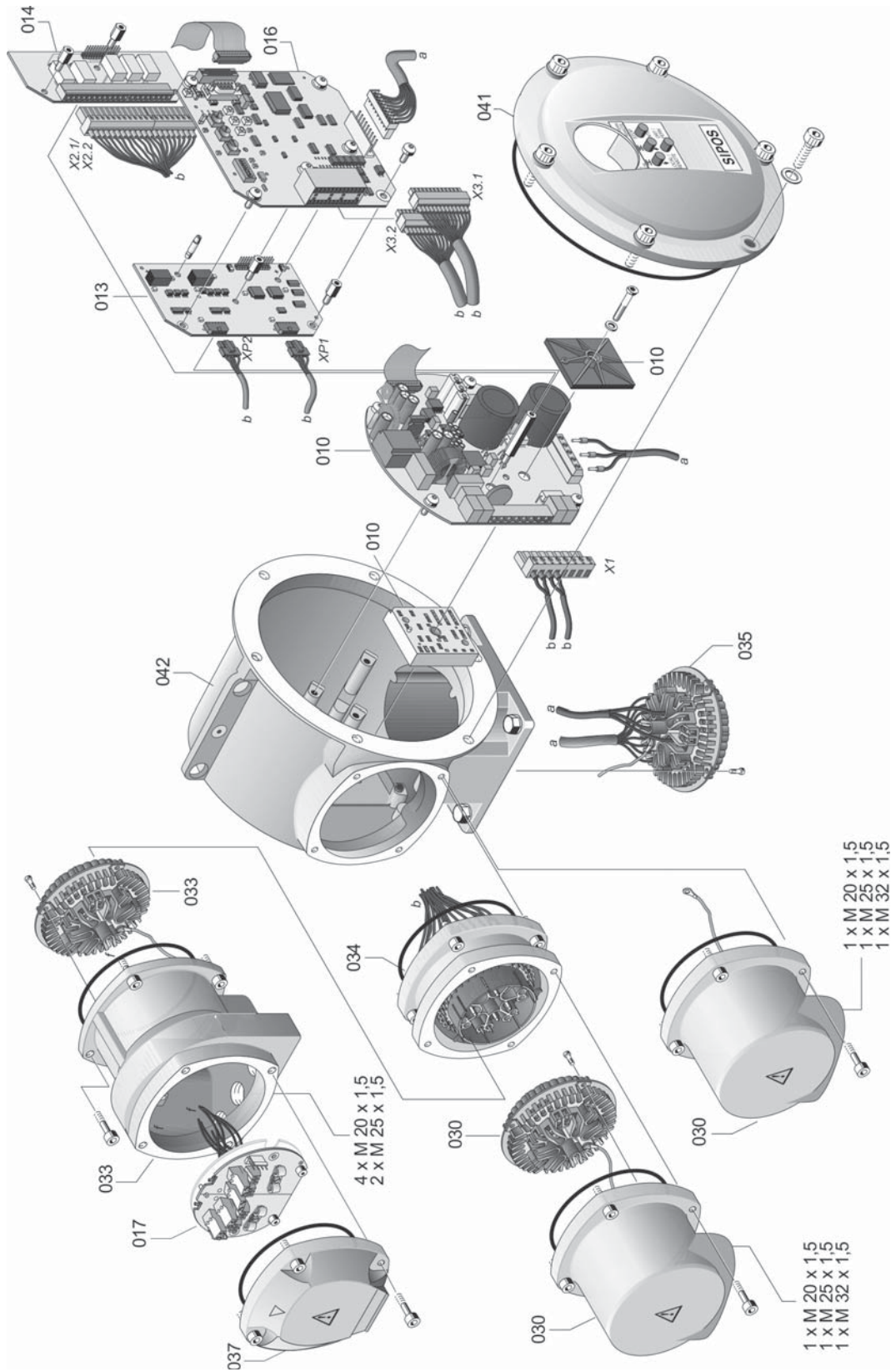
8.3.5 Small part-turn gear unit 2SG5...-



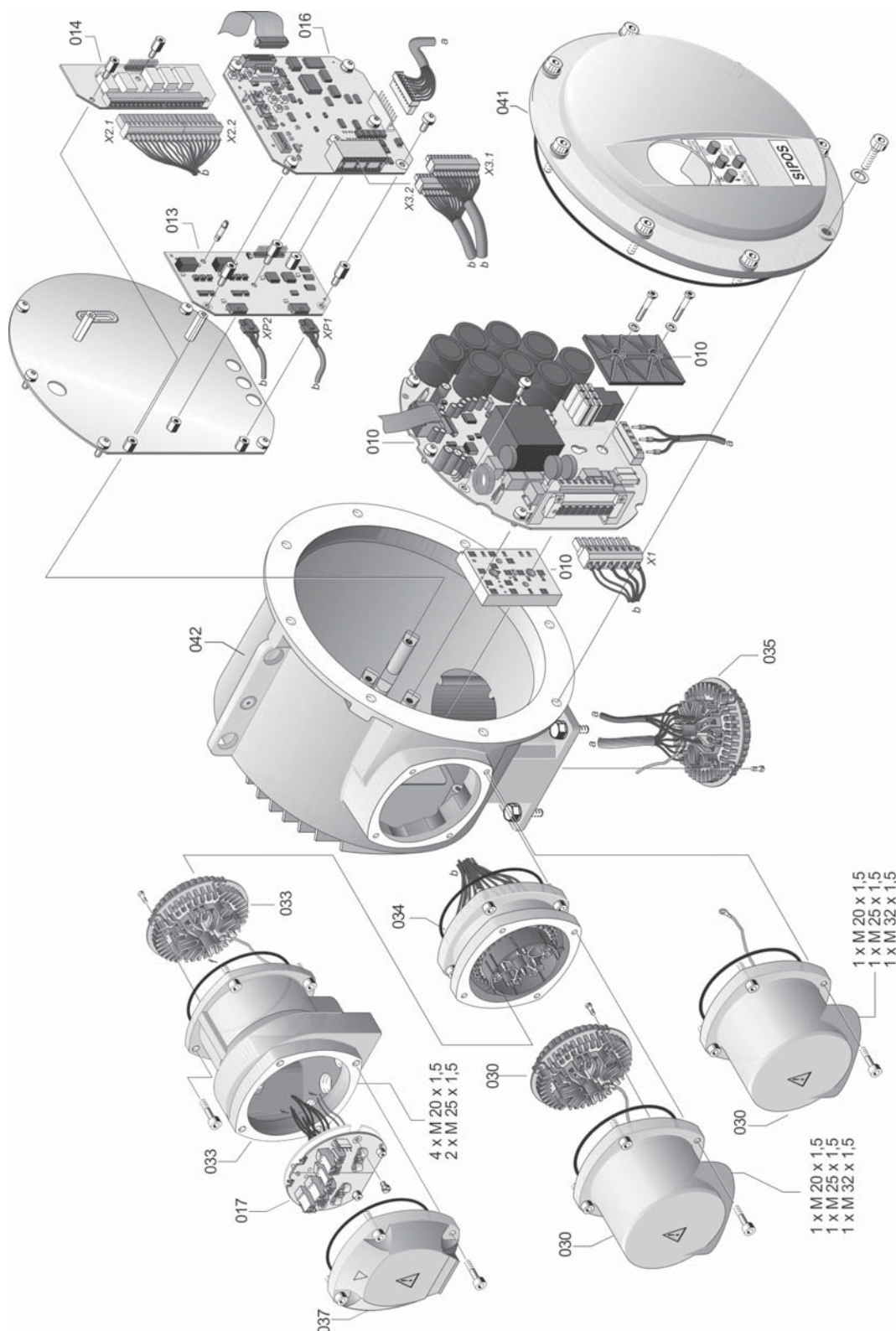
8.3.6 Gear unit with part-turn unit 2SC5...-



8.3.7 Electronics unit (motor up to 1.5 kW)



8.3.8 Electronics unit (motor from 3 kW)



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**Original Declaration
of Incorporation of Partly Completed Machinery
(EC Directive 2006/42/EC) and EC Declaration of
Conformity in compliance with the Directives on
EMC and Low Voltage**

SIPOS Aktorik GmbH as manufacturer declares herewith, that the above mentioned electric actuators meet the following basic requirements of the EC Machinery Directive 2006/42/EC: Annex I, articles 1.1.2, 1.1.3, 1.1.5, 1.2.1; 1.2.6, 1.3.1, 1.3.7, 1.5.1, 1.6.3, 1.7.1, 1.7.3, 1.7.4.

Manufacturer: SIPOS Aktorik GmbH, Im Erlet 2, 90518 Altdorf, Germany

Type of product: Electric actuator

Authorised person
for documentation: Dr. Thomas Suckut, Im Erlet 2, 90518 Altdorf, Germany

Type range: 2SA5..., 2SB5..., 2SC5..., 2SG5...

The product complies with the following harmonised standards with respect to the EC Machinery Directive:
EN 12100: 2010 EN 60204-1: 2006 /A1: 2009 /AC: 2010

Furthermore the following safety relevant standards are regarded:
ISO 5210 1996 ISO 5211: 2001 DIN 3358: 1982

With regard to the partly completed machinery, the manufacturer commits to submitting the documents to the competent national authority via electronic transmission upon request. The relevant technical documentation pertaining to the machinery described in Annex VII, part B has been prepared.

SIPOS actuators are designed to be installed on industrial valves. SIPOS actuators must not be put into service until the final machinery into which they are to be incorporated has been declared in conformity with the provisions of the EC Directive 2006/42/EC.

As partly completed machinery, the actuators further comply with the requirements of the following directives and the respective approximation of national laws as well as the respective harmonised standards as listed below:

- Directive relating to Electromagnetic Compatibility (EMC) (2004/108/EC):
EN 61800-3: 2004 /A1: 2012
- Low Voltage Directive (2006/95/EC):
EN 60204-1: 2006 /A1: 2009 /AC: 2010
EN 60034-1: 2010 EN 50178: 1997 EN 61010-1: 2010

Year of affixing of the CE marking: 2015
Altdorf, 12.11.2015


Dr. Thomas Suckut
General Manager

This declaration does not contain any guarantees. The safety instructions in product documentation supplied with the devices must be observed. Non-concerted modification of the devices voids this declaration.



Certificates are valid as from the indicated date of issue. Subject to changes without notice. The latest versions are available for download at <http://www.sipos.de..>

